

From: Garry Christensen
To: Jerry Finlinson
Date: 3/31/2004 5:07 PM
Subject: Re: Burner and Windbox temps 31mar04

Jerry, it is the out of service burners that heat up.

>>> Jerry Finlinson 3/31/2004 4:02:52 PM >>>

FYI,

Jim Knapp and I went out Wednesday 31mar04 2pm and measured the windbox and burner temperatures on U2.

This was done at load of 885 MW with F mill out of service and cooling air in F and the OFA.

Secondary air temp is 687 F,

B1 windbox = 657

B6 windbox = 658

OFA SW = 658 F, Flow = 62,000 lb/hr

OFA SE = 661 F, Flow = 0 lb/hr, suspect transmitter tubes disconnected.

OFA NW = 673 F, Flow = 104,000 lb/hr

OFA SW = 672 F, Flow = 0 lb/hr, suspect transmitter tubes disconnected.

Conclusion, south side appears uniform but about 30 degrees cooler than secondary air duct temp.

North side is about 15 degrees cooler than secondary air temp.

Top row burners E1, E3, D1, D3 with thermocouple welded on:

front, backplate

E1: 840, 668

E3: 918, 673

D1: 932, 678

D3: 983, 486 ??

Conclusions: backplate temp is similar to secondary air temperature, so it's not receiving heavy radiation from fireball.

D3 was hotter than E3, possibly because of F mill being OOS on that side. Also, in general we see the north side secondary air hotter than south side. Why?

These temps are well within specs of the burner design.

Later, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026212

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 4/1/2004 8:12 AM
Subject: RE: Burner and Windbox temps 31mar04

Jerry,
Thank you for the information.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, March 31, 2004 6:03 PM
To: Aaron Nissen; Garry Christensen; James Nelson
Cc: sal@advancedburner.com; tarkel@advancedburner.com; Bill Morgan; Dave Spence; Howard Hamilton; Jim Knapp; Jon Christensen; Jon Finlinson; Ken Nielson
Subject: Burner and Windbox temps 31mar04

FYI,
Jim Knapp and I went out Wednesday 31mar04 2pm and measured the windbox and burner temperatures on U2.
This was done at load of 885 MW with F mill out of service and cooling air in F and the OFA.

Secondary air temp is 687 F,

B1 windbox = 657
B6 windbox = 658

OFA SW = 658 F, Flow = 62,000 lb/hr
OFA SE = 661 F, Flow = 0 lb/hr, suspect transmitter tubes disconnected.
OFA NW = 673 F, Flow = 104,000 lb/hr
OFA SW = 672 F, Flow = 0 lb/hr, suspect transmitter tubes disconnected.

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front, backplate
E1: 840, 668
E3: 918, 673

D1: 932, 678
D3: 983, 486 ??

Conclusions: backplate temp is similar to secondary air temperature, so it's not receiving heavy radiation from fireball.
D3 was hotter than E3, possibly because of F mill being OOS on that side. Also, in general we see the north side secondary air hotter than south side. Why?

These temps are well within specs of the burner design.

IP7_026213

Later, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

From: Andy Chew <achew@airmonitor.com>
To: "Jerry Finlinson (E-mail)" <Jerry-F@ipsc.com>
Date: 4/14/2004 10:37 AM
Subject: Transmitter DP Range - ABT/Intermountain Burners

Jerry,

Are the DP transmitters for the burners operating satisfactorily in the 2" w.c range?

Regards,

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026215

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
Date: 4/14/2004 1:33 PM
Subject: RE: Transmitter DP Range - ABT/Intermountain Burners

Jerry,

I think we can order 3" transducers, but we do not stock that size. I will look into and advise.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 14, 2004 11:49 AM
To: Andy Chew
Subject: Re: Transmitter DP Range - ABT/Intermountain Burners

Currently we have 2 of the 48 that are overranged. It depends on the spin vane and damper settings.
Most of them are operating below 1 inch.

We are currently operating the unit at 900 MW, but will be uprating to 950 MW, which will increase the flow.

So we may have a few more go overrange.

I might be best to upgrade. I thought the next range was 5 inches, do you offer a 3 inch transmitter?

Dan Beistel is here with me today. We went through and changed all the filters to 5 and the after purge time to 1.5 minutes.

We were getting tubes blown off, probably after purge with the 0.8 minute setting.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/14/2004 10:34:51 AM >>>
Jerry,

Are the DP transmitters for the burners operating satisfactorily in the 2" w.c range?

Regards,

Andy

IP7_026216

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
Date: 4/14/2004 2:30 PM
Subject: RE: Transmitter DP Range - ABT/Intermountain Burners

Yes, that can be done. Probably the best option. Let me know if you intend to proceed with this plan.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 14, 2004 1:19 PM
To: Andy Chew
Subject: RE: Transmitter DP Range - ABT/Intermountain Burners

Would it be almost as good to order 5" ones and span them to 3 inches? Then we'd have the option of increasing the range if necessary.
Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/14/2004 1:29:45 PM >>>
Jerry,

I think we can order 3" transducers, but we do not stock that size. I will look into and advise.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 14, 2004 11:49 AM
To: Andy Chew
Subject: Re: Transmitter DP Range - ABT/Intermountain Burners

Currently we have 2 of the 48 that are overranged. It depends on the spin vane and damper settings.
Most of them are operating below 1 inch.

We are currently operating the unit at 900 MW, but will be upgrading to 950 MW, which will increase the flow.
So we may have a few more go overrange.
I might be best to upgrade. I thought the next range was 5 inches, do you offer a 3 inch transmitter?

IP7_026218

Dan Beistel is here with me today. We went through and changed all the filters to 5 and the after purge time to 1.5 minutes. We were getting tubes blown off, probably after purge with the 0.8 minute setting.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/14/2004 10:34:51 AM >>>
Jerry,

Are the DP transmitters for the burners operating satisfactorily in the 2" w.c range?

Regards,

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
Date: 4/14/2004 4:28 PM
Subject: RE: Transmitter DP Range - ABT/Intermountain Burners

Jerry,

I have forwarded your inquiry to the appropriate persons here at Air Monitor to advise so I will be getting back to you soon.

Thank you.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 14, 2004 1:35 PM
To: Andy Chew
Cc: Aaron Nissen; Bill Morgan; Garry Christensen; James Nelson; Jon Christensen; Ken Nielson
Subject: RE: Transmitter DP Range - ABT/Intermountain Burners

Andy,

We'll be having Dan Beistel come back in a few weeks to calibrate our overfire air.

We could have him work with us to install the new transmitters at that time.

What do we need to do to proceed with the option to upgrade to 5" xmitters with 3" span?

We'd like to have them wind tunnel tested at higher DP's as well.

Is there any cost to exchange the transducers, or is it mostly a 2 day labor cost to have them installed and recalibrated?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/14/2004 2:27:40 PM >>>
Yes, that can be done. Probably the best option. Let me know if you intend to proceed with this plan.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 14, 2004 1:19 PM
To: Andy Chew

IP7_026220

Subject: RE: Transmitter DP Range - ABT/Intermountain Burners

Would it be almost as good to order 5" ones and span them to 3 inches?
Then we'd have the option of increasing the range if necessary.
Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/14/2004 1:29:45 PM >>>
Jerry,

I think we can order 3" transducers, but we do not stock that size. I
will
look into and advise.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 14, 2004 11:49 AM
To: Andy Chew
Subject: Re: Transmitter DP Range - ABT/Intermountain Burners

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spin vane and damper settings.
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I might be best to upgrade. I thought the next range was 5 inches, do
you offer a 3 inch transmitter?

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the
filters to 5 and the after purge time to 1.5 minutes.
We were getting tubes blown off, probably after purge with the 0.8
minute setting.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670

IP7_026221

jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/14/2004 10:34:51 AM >>>
Jerry,

Are the DP transmitters for the burners operating satisfactorily in
the
2"
w.c range?

Regards,

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026222

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 4/15/2004 7:43 AM
Subject: FW: ABT/Intermountain Power - Burner IBAMS Airflow Measurement Project - Air Monitor Work Order Number 50633
Attachments: W50633BC.PDF

Jerry,

Is this as built change due to an IPSC field change? I spoke with our burner fabrication shop and they told me that the static pressure taps were on top for both the CW and CCW orientation burners.

How are the airflow measurements working?

Sal

-----Original Message-----

From: Andy Chew [mailto:achew@airmonitor.com]
Sent: Thursday, March 25, 2004 2:29 PM
To: 'sal@advancedburner.com'
Cc: 'mstaph@ix.netcom.com'; 'Jerry Finlinson (E-mail)'
Subject: RE: ABT/Intermountain Power - Burner IBAMS Airflow Measurement Project - Air Monitor Work Order Number 50633

Sal,

Jerry Finlinson pointed out to us that there was an as built change to the burner total and static pressure signal take-off fittings depending if the burner was a CW or CCW design. Please see attached PDF of Air Monitor drawing W50633BC REV 1 which addresses this issue.

I will include this revised drawing in the final As-Installed Record Submittal.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

-----Original Message-----

From: Andy Chew
Sent: Friday, March 19, 2004 1:23 PM
To: 'sal@advancedburner.com'
Cc: 'mstaph@ix.netcom.com'; Jerry Finlinson (E-mail)
Subject: ABT/Intermountain Power - Burner IBAMS Airflow Measurement Project
- Air Monitor Work Order Number 50633

PO NO A03-008-413
AMC WO NO 50633

IP7_026223

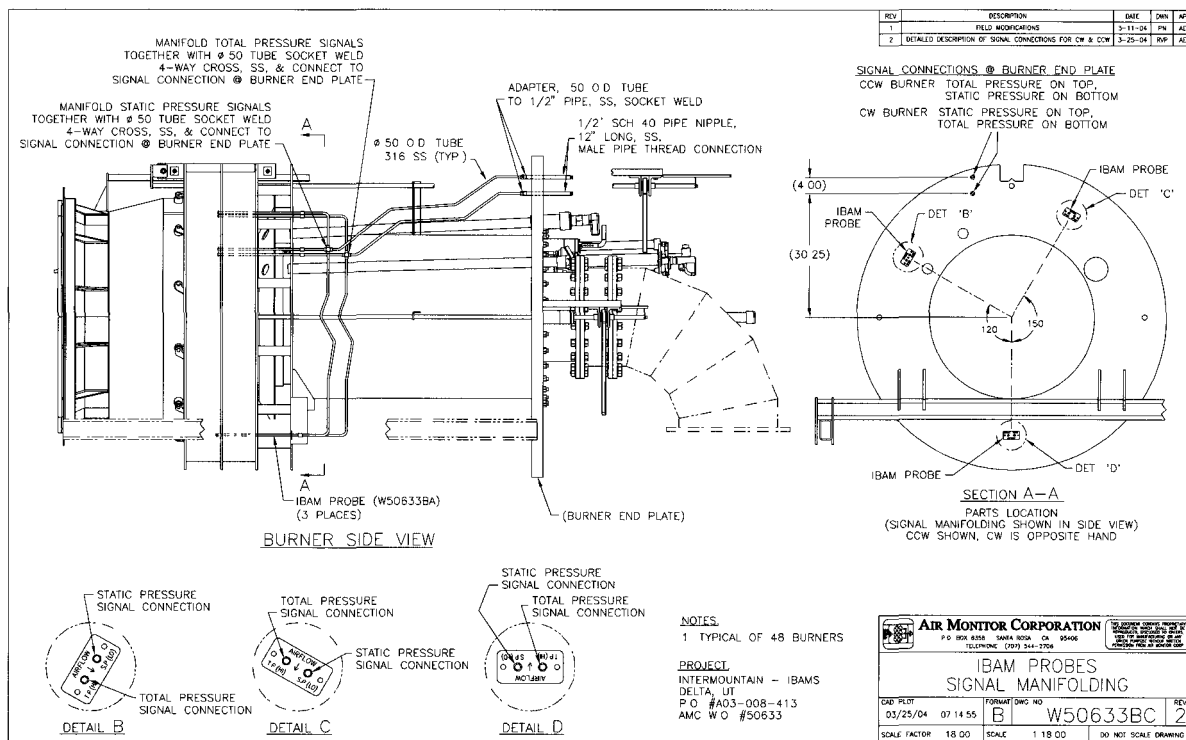
Sal,

Please see attached As-Built Record Submittal for the above project. I have copied Jerry Finlinson at IPSC.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026224



From: Andy Chew <achew@airmonitor.com>
To: "Jerry Finlinson (E-mail)" <Jerry-F@ipsc.com>
Date: 4/15/2004 11:29 AM
Subject: Burner DP transmitter/transducer change out and OFA startup

Jerry,

Matt Maragos should be sending you a note today regarding the transducer change out on the burner DP transmitters.

Can you confirm for me the Air Monitor work order is 50600 for the OFA system startup you are looking to perform in a few weeks?

Thanks.

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026226

From: Jerry Finlinson
To: Salvatore Ferrara
Date: 4/15/2004 12:04 PM
Subject: Re: FW: ABT/Intermountain Power - Burner IBAMS Airflow Measurement Project - Air Monitor Work Order Numb

Apparently there was some confusion at the shop, because they got them backwards. We just noted that they are different. We didn't make any intentional change there.

They are mostly working OK, we'll be getting into the air flow balancing next week, then we'll know better. It's a little complicated to enter all the different equations and curve fits in order to get the highest accuracy, but we think we'll do OK. I'll let you know our results later.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 4/15/2004 7:37:58 AM >>>

Jerry,

Is this as built change due to an IPSC field change? I spoke with our burner fabrication shop and they told me that the static pressure taps were on top for both the CW and CCW orientation burners.

How are the airflow measurements working?

Sal

-----Original Message-----

From: Andy Chew [mailto:achew@airmonitor.com]

Sent: Thursday, March 25, 2004 2:29 PM

To: 'sal@advancedburner.com'

Cc: 'mstaph@ix.netcom.com'; 'Jerry Finlinson (E-mail)'

Subject: RE: ABT/Intermountain Power - Burner IBAMS Airflow Measurement Project - Air Monitor Work Order Number 50633

Sal,

Jerry Finlinson pointed out to us that there was an as built change to the burner total and static pressure signal take-off fittings depending if the burner was a CW or CCW design. Please see attached PDF of Air Monitor drawing W50633BC REV 1 which addresses this issue.

I will include this revised drawing in the final As-Installed Record Submittal.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation

IP7_026227

PH 707-521-1709
FX 707-526-2825

-----Original Message-----

From: Andy Chew
Sent: Friday, March 19, 2004 1:23 PM
To: 'sal@advancedburner.com'
Cc: 'mstaph@ix.netcom.com'; Jerry Finlinson (E-mail)
Subject: ABT/Intermountain Power - Burner IBAMS Airflow Measurement Project
- Air Monitor Work Order Number 50633

PO NO A03-008-413
AMC WO NO 50633

Sal,

Please see attached As-Built Record Submittal for the above project. I have copied Jerry Finlinson at IPSC.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026228

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
CC: Janet Bauman <jbauman@airmonitor.com>
Date: 4/15/2004 1:14 PM
Subject: RE: Burner DP transmitter/transducer change out and OFA startup

Jerry,

We will ship six fully characterized 0-5" w.c. transducers to Intermountain. You will be invoiced for them but we will credit back the invoice amount when you ship us back the six replaced 2" w.c. transducers. I will get a procedure to you or have a technician available to train someone over the phone.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, April 15, 2004 11:09 AM
To: Andy Chew
Subject: Re: Burner DP transmitter/transducer change out and OFA startup

Actually, our performance guys want to do boiler balancing next week. So we'd appreciate it if you could send 5 or 6 of the 5 inch transmitters here asap along with installation instructions. We'll need to change out just a few that are overranged. Currently we have 2 of them overranged.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/15/2004 11:26:11 AM >>>
Jerry,

Matt Maragos should be sending you a note today regarding the transducer change out on the burner DP transmitters.

Can you confirm for me the Air Monitor work order is 50600 for the OFA system startup you are looking to perform in a few weeks?

Thanks.

Andy

Andrew Chew

IP7_026229

Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
CC: Janet Bauman <jbauman@airmonitor.com>
Date: 4/15/2004 1:19 PM
Subject: RE: Burner DP transmitter/transducer change out and OFA startup

Jerry,

I will also be supplying you with an RMA number to return the six replaced transducers.

Andy

-----Original Message-----

From: Andy Chew
Sent: Thursday, April 15, 2004 12:11 PM
To: 'Jerry Finlinson'
Cc: Janet Bauman
Subject: RE: Burner DP transmitter/transducer change out and OFA startup

Jerry,

We will ship six fully characterized 0-5" w.c. transducers to Intermountain. You will be invoiced for them but we will credit back the invoice amount when you ship us back the six replaced 2" w.c. transducers. I will get a procedure to you or have a technician available to train someone over the phone.

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Andy

-----Original Message-----

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Sent: Thursday, April 15, 2004 11:09 AM
To: Andy Chew
Subject: Re: Burner DP transmitter/transducer change out and OFA startup

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Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026231

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Jerry,

Matt Maragos should be sending you a note today regarding the
transducer
change out on the burner DP transmitters.

Can you confirm for me the Air Monitor work order is 50600 for the OFA
system startup you are looking to perform in a few weeks?

Thanks.

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

From: Andy Chew <achew@airmonitor.com>
To: "Jerry Finlinson (E-mail)" <Jerry-F@ipsc.com>
Date: 4/16/2004 4:12 PM
Subject: FW: As Built Record Submittal For Intermountain IBAM's Project - PO A03-008-413 - Air Monitor WO NO 50633
Attachments: 50633 R2 As-Built Submittal 4-16-04.pdf

Jerry,

See attached pdf As Built Submittal.

Regards,

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

-----Original Message-----

From: Andy Chew
Sent: Friday, April 16, 2004 3:07 PM
To: Sal Ferrara (E-mail)
Subject: As Built Record Submittal For Intermountain IBAM's Project - PO A03-008-413 - Air Monitor WO NO 50633

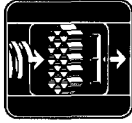
Sal,

Please see attached As Built Record Submittal Revision 2 for the IPSC IBAM's project. I will assume it is alright to send Jerry Finlinson a copy of the As Built Submittal to keep him informed post installation.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026233



**AIR MONITOR
CORPORATION**

P O Box 6358
Santa Rosa, CA 95406
707 544 2706 - P
707 526 2825 - F

AS BUILT SUBMITTAL TRANSMITTAL

To Sal Ferrera
Advanced Burner Technologies
P.O. Box 410
Pluckemin, NJ 07978

Date April 16, 2004

AMC Work Order 50633
Purchase Order A03-008-413
Project Intermountain - IBAMS

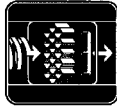
cc Mike Stapf, Sr. (mstapf@ix.netcom.com)

Project Manager Andrew Chew
Sent Via sal@advancedburner.com

Enclosed find:

1 As-Built Submittal, Rev. 2

IP7_026234



**AIR MONITOR
CORPORATION**

**WORK ORDER 50633
PURCHASE ORDER A03-008-413**

AS BUILT SUBMITTAL

PROJECT Intermountain - IBAMS

LOCATION Delta, UT

EQUIPMENT IBAM, VELTRON II in AUTO-purge/SP,

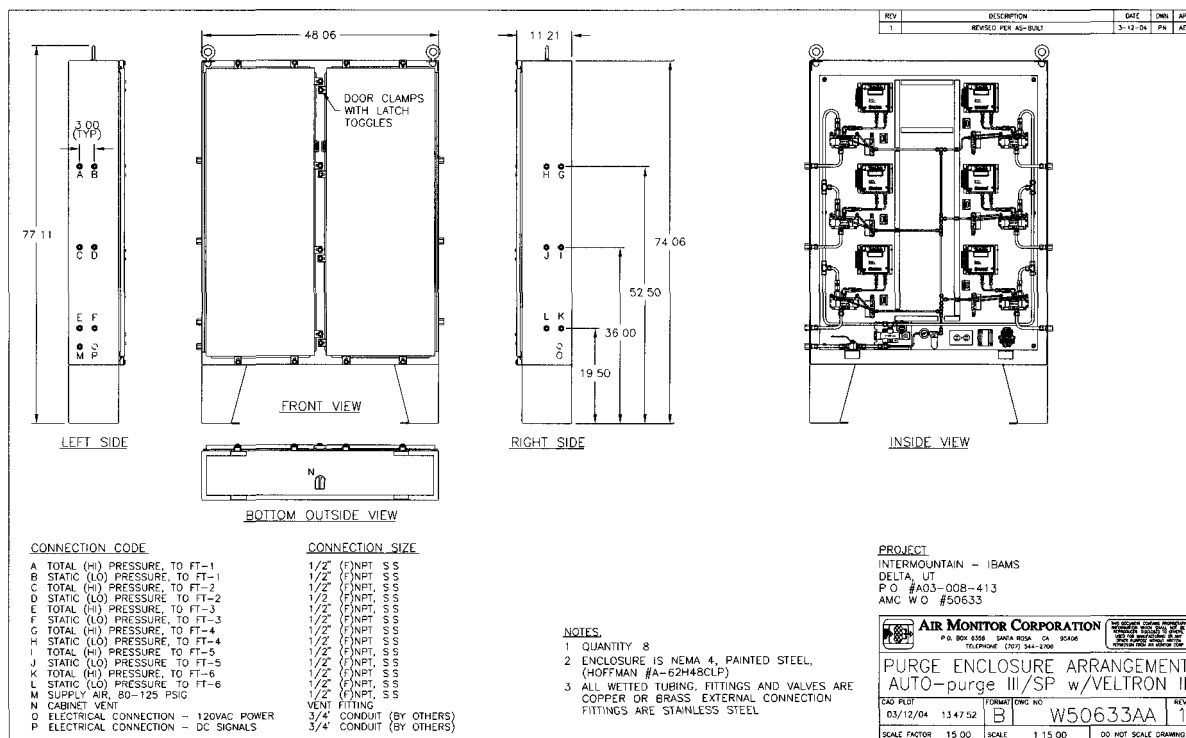
Burner Performance Testing and CFD Modeling

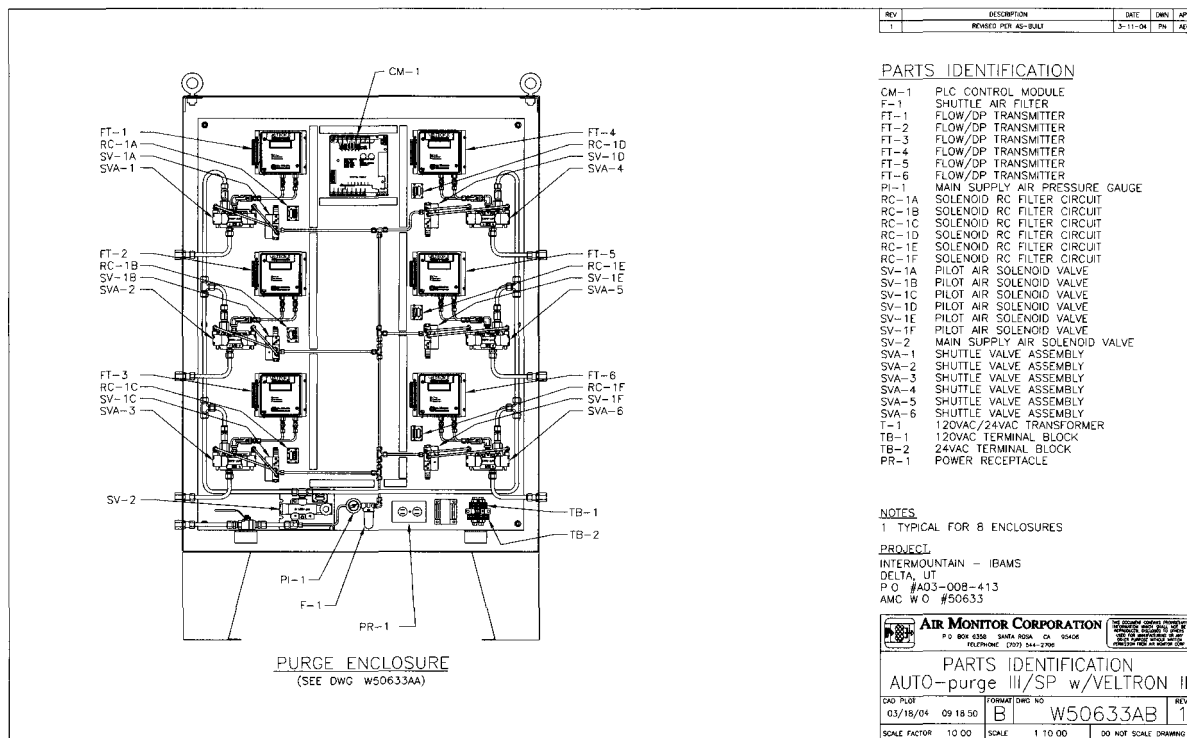
REPRESENTATIVE Stapf Energy Services

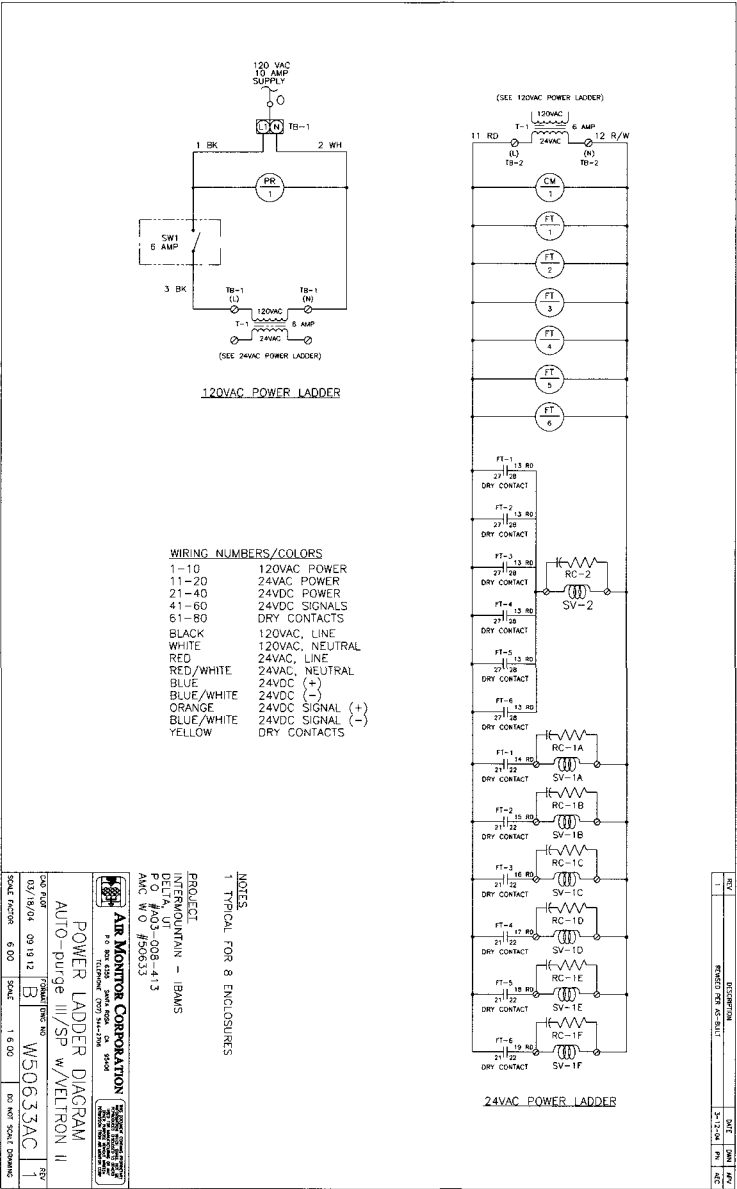
CONTACT Mike Stapf, Sr.

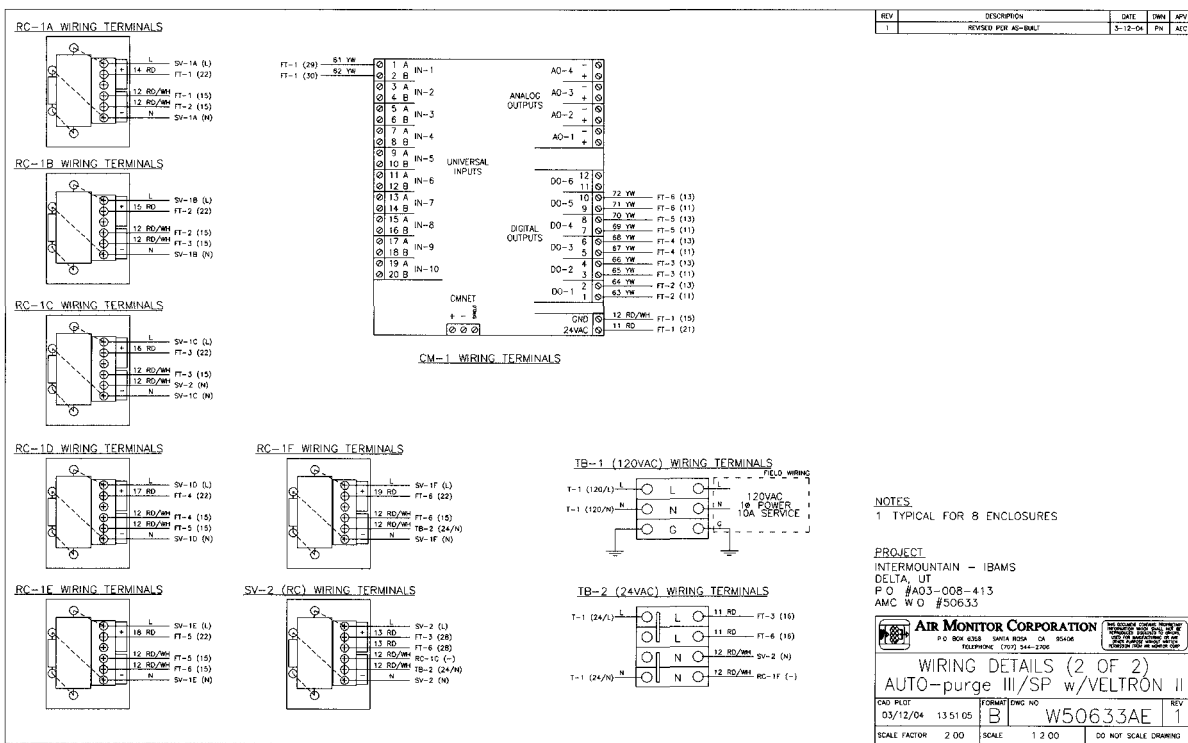
PHONE 610-783-7166

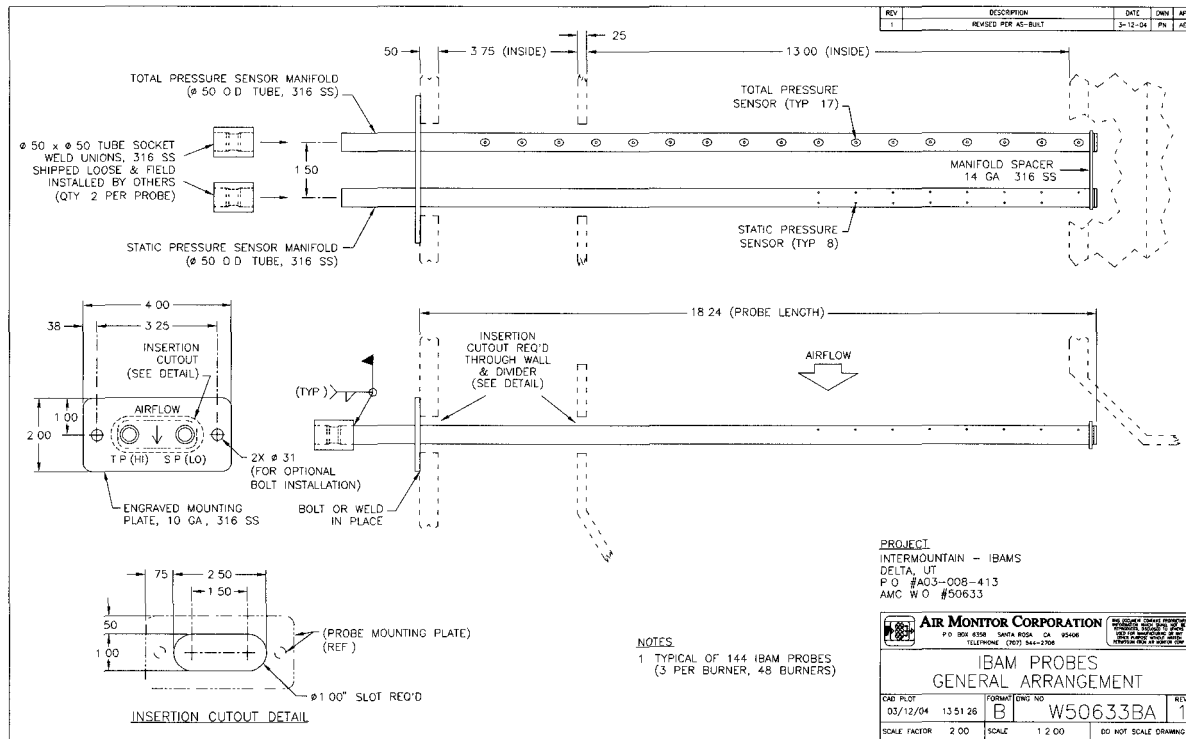
Date	Rev	Project Manager
12/12/03	0	Andrew Chew
03/19/04	1, AS-BUILT	Andrew Chew
04/16/04	2, AS-BUILT	Andrew Chew



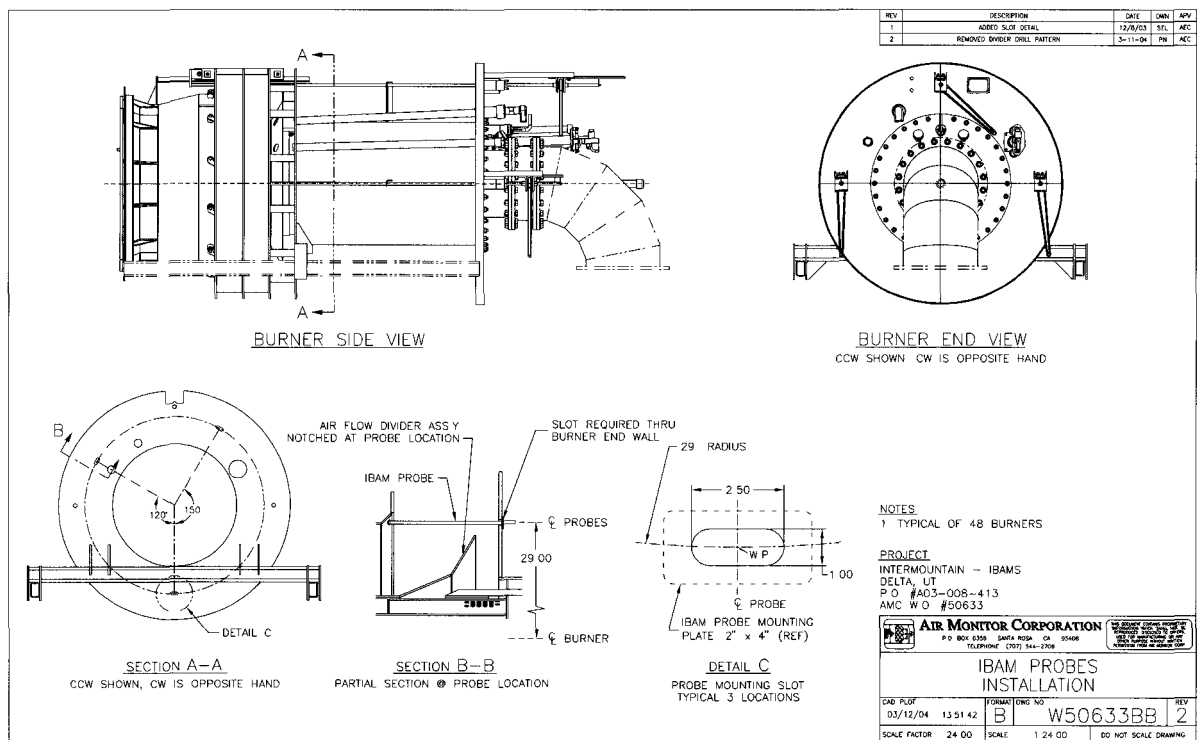




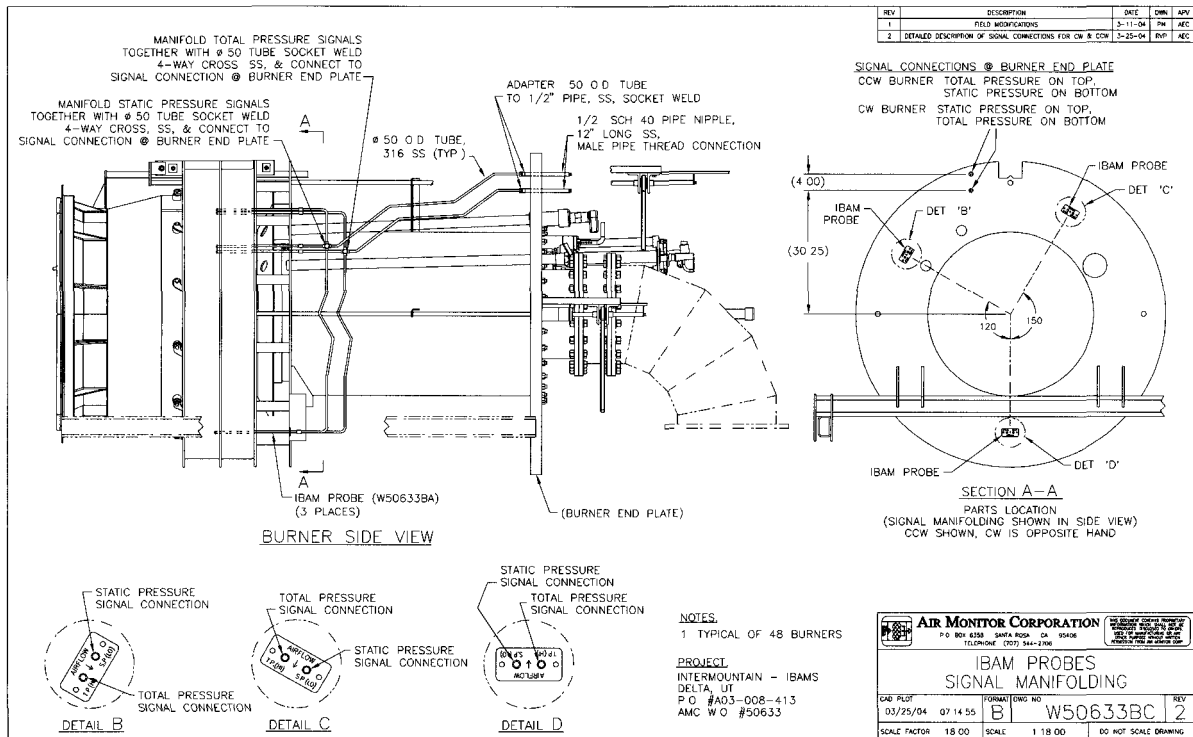


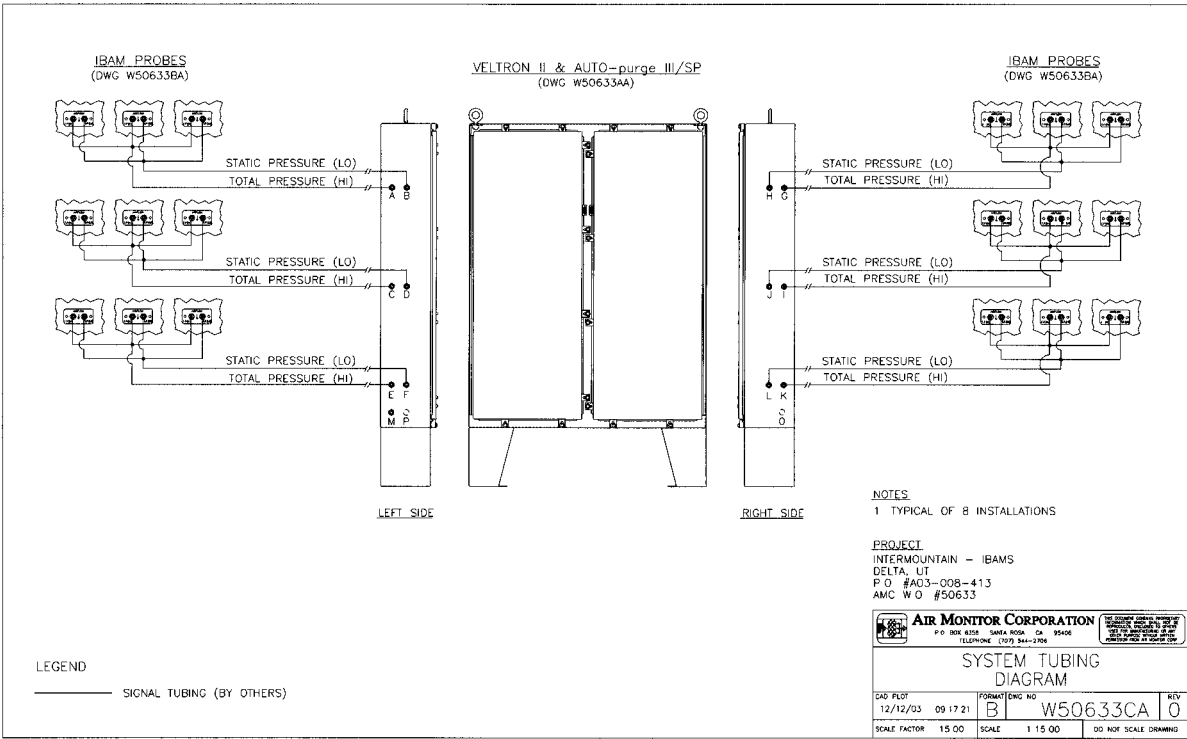


IP7_026241



IP7_026242





AUTO-purge III INSTALLATION GUIDE

Air Requirement.

80 to 125 psig at 100 CFM, oil and dirt free 1 to 24 purge cycles per day, with a field selectable duration between 30 and 120 seconds during which compressed air is released

Line Size from AUTO-purge Panel to Flow Measuring Station or Probes.

<u>Distance from AUTO-purge panel to flow measuring station air probe.</u>	<u>Tube Size.</u>
< 25'	1/2" S S tube
25' - 50'	3/4" S S tube
> 50'	1 0" S S tube

Accumulator Tank (strongly recommended).

Requires coalescing filter, pressure regulator, and check valve at the tank inlet

- 120 gallons - All CA stations
- 120 gallons - Multiple VOLU-probes having a combined length greater than 10'
- 80 gallons - One or more VOLU-probes having a combined length less than 10'

Line from Accumulator Tank to AUTO-purge Panel.

25' maximum length, 1/2" pipe (minimum) Recommend locating accumulator tank as close as possible to AUTO-purge panel

Electrical Power Requirement.

None when used with an Air Monitor transmitter (NOTE This adds 36VA to the transmitter's power requirement)
24VAC, 36VA when not initiated by an Air Monitor transmitter
120VAC, 10 amp when an optional enclosure heater is installed

Ambient Temperature.

40°F-140°F For ranges above or below this ambient temperature, use of panel heater and/or cooler is required

Purge Frequency.

Once/day minimum, once/hour maximum

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AIR MONITOR
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SUB-M009, Rev 5 (8/01)

8.30.2

IP7_026245

SUBMITTAL SHEET

VELTRON II ULTRA-LOW RANGE DIFFERENTIAL PRESSURE/ FLOW TRANSMITTER

OPTIONS <input type="checkbox"/> Alarms or <input checked="" type="checkbox"/> AUTO-purge Management <input type="checkbox"/> Auxiliary Output <input type="checkbox"/> Terminal Cover/Conduit Connection	Special Function <input type="checkbox"/> % Deviation <input type="checkbox"/> Summed Flow <input type="checkbox"/> Averaged Flow <input type="checkbox"/> Differential Flow <input type="checkbox"/> Low Select <input type="checkbox"/> High Select	Power <input type="checkbox"/> 24VAC <input type="checkbox"/> 20-40VDC <input checked="" type="checkbox"/> 120VAC (via external transformer)	Certification <input type="checkbox"/> Standard <input type="checkbox"/> NIST Traceable Display <input checked="" type="checkbox"/> 2x20 LCD (Std) <input type="checkbox"/> 4x20 LCD
--	--	--	---

PERFORMANCE SPECIFICATIONS Accuracy. $\pm 0.1\%$ of Natural Span, including non-linearity, hysteresis, deadband, and non-repeatability Stability. $\pm 0.5\%$ of Natural Span for one year Temperature Effect. Zero None; corrected by AUTO-zero Span 0.015% of Full Span/ $^{\circ}\text{F}$	Mounting Position Effect. None, corrected by AUTO-zero Transducer Response Time. 0.5 seconds to reach 98% of a step change Power Consumption. Standard 18VA at 24VAC, 13VA at 24VDC, 36VA at 120VAC With AUTO-purge Management 54VA at 24VAC, 48VA at 24VDC, 108VA at 120VAC
---	---

FUNCTIONAL SPECIFICATIONS Digital Outputs. Dual form C dry contacts rated for 3 Amps at 24VAC/VDC for optional Hi/Lo alarm Dual Form A dry contacts rated for 3 amps at 24VAC/VDC for AUTO-purge activation and acknowledgment Digital Inputs. Dry contact for AUTO-purge external start command Analog Outputs. Dual transmitter outputs are individually configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC Two additional outputs are optionally available Analog Inputs. A single input is field configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC For use with optional special function AUTO-purge Management. AUTO-purge cycle is initiated via an external dry contact input, or via an internal timer with field selectable frequencies of 1 to 24 hours, in 1 hour increments An SPDT dry contact controls the AUTO-purge System, a second dry contact provides remote purge activation acknowledgment Power Supply. Standard 24VAC (20-28VAC) or 24VDC (20-40VDC), with automatic selection Optional 120VAC (100-132VAC), via external transformer	Low Pass Filtration. Response time to reach 98% of a step change is adjustable from 2.0 to 250.0 seconds Automatic Zeroing. Accuracy Within 0.1% of calibrated span Frequency Every 1 to 24 hours on 1 hour intervals Overpressure and Static Pressure Limit. 25 psig Circuit Protection. Power input is isolated, fused and reverse polarity protected Span and Zero Adjustment. Digital, via internally located push-buttons Displays. Standard 2 line x 20 character LCD provides one line of data display Optional 4 line x 20 character LCD provides up to 4 lines of data display LED's indicate CPU activated, AUTO-zero in progress, AUTO-zero over-ranged, AUTO-purge in progress, and auxiliary alarm "on" status Humidity Limits. 0-95% RH, non-condensing Temperature Limits. -20 $^{\circ}\text{F}$ to 180 $^{\circ}\text{F}$ Storage +40 $^{\circ}\text{F}$ to 140 $^{\circ}\text{F}$ Operating
---	---

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AIR MONITOR
CORPORATION

6.88.2

SUB-B010, Rev 9 (10/02)

IP7_026246

SUBMITTAL SHEET

VELTRON II ULTRA-LOW RANGE DIFFERENTIAL PRESSURE/ FLOW TRANSMITTER

PHYSICAL SPECIFICATIONS

Signal Connections.

High and low pressure, 1/8" FPT

Enclosure.

NEMA 1 aluminum enclosure

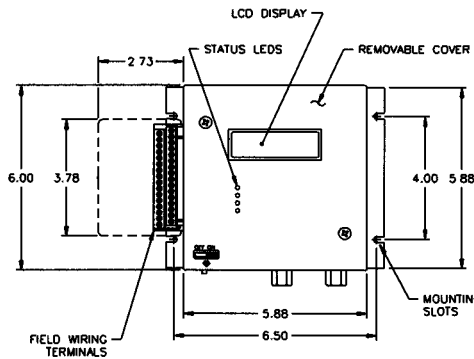
Electrical Connections.

External terminal strip with plug-in connectors. Optional terminal strip enclosure with dual 3/4" conduit connections

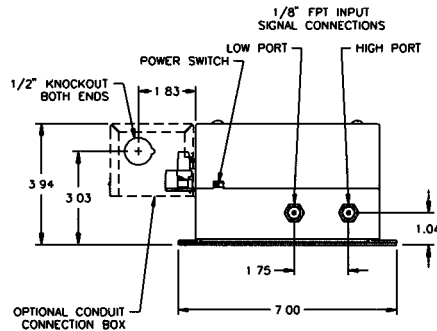
Weight.

4.1 lbs

DIMENSIONAL SPECIFICATIONS

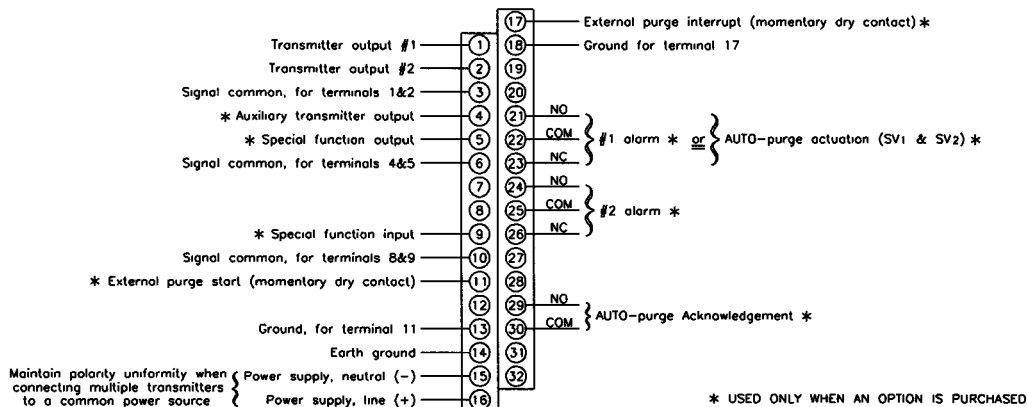


FRONT VIEW



BOTTOM VIEW

WIRING DIAGRAM



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SUB-B011, Rev 5 (10/02)



AIR MONITOR
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6.88.4

IP7_026247



**AIR MONITOR
CORPORATION**

TRANSMITTER SPAN/MASS FLOW CALCULATIONS

PROJECT: **ABT/INTERMOUNTAIN POWER BURNER**
 WORK ORDER: **50633** REV: **2**
 TAG(S): _____

Given Information:

Fluid:
 Standard Temperature (T_{std}):
 Standard Barometric Pressure (P_{std}):
 Air Temperature (T):
 Stack/Duct Pressure (P_g):
 Actual Barometric Pressure (P_{bat}):
 Air Density at Standard Conditions, DRY:
 Duct Shape:
 Duct Diameter:

AIR	
68	(deg. F)
29.921	(in. Hg)
645	(deg. F)
3.00	(in. w.c.)
25.105	(in. Hg)
0.07513	(lbs/ft ³)
CIRC	
62.805	(in.)

% H₂O (by volume)
0.00 (%)

Maximum Differential Pressure:
2.0000 (inches w.c.)

Square Root Extraction? (Yes/No)
No

Output (4-20,0-10,0-5):
4-20 mADC

Calculations:

Stack/Duct Area (A_s): 21.514 (ft²)
 Maximum Actual Velocity: 8,903 (AFPM)
 Absolute Stack/Duct Pressure (P_s): 25.326 (in. Hg)
 Dry Mole Fraction of Stack/Duct (Mfd): 1.000
 Dry Molecular Wt. Of Air (Md): 28.965 (lb/lb-mole)
 Wet Molecular Wt. Of Air (Ms): 28.965 (lb/lb-mole)
 Air Density at Standard Conditions, WET: 0.07513 (lbs/ft³)
 Air Density at Actual Conditions, WET: 0.03039 (lbs/ft³)

% DP (%)	Diff Press (in. w.c.)	Output (mADC)
0	0.0000	4.00
10	0.2000	5.60
20	0.4000	7.20
30	0.6000	8.80
40	0.8000	10.40
50	1.0000	12.00
60	1.2000	13.60
70	1.4000	15.20
80	1.6000	16.80
90	1.8000	18.40
100	2.0000	20.00

Transmitter:

VELTRON II

Flow Element:

IBAM

Transmitter Maximum Range:

0 - 2.00 in w.c.

Power (voltage/type):

24VAC

Power Configuration:

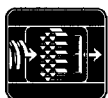
4-Wire

Square Root:

OFF

Display Line #1: **0 - 2.00 in w.c.** (DIFFERENTIAL PRESSURE)

ACTUAL D.P. GENERATED BY IBAM PROBES REQUIRE CORRECTION TO CALCULATE TRUE FLOW



**AIR MONITOR
CORPORATION**

TRANSMITTER SPAN/MASS FLOW CALCULATIONS

PROJECT: **ABT/INTERMOUNTAIN POWER BURNER**
 WORK ORDER: **50633** REV: **2a**
 TAG(S): _____

Given Information:

Fluid:
 Standard Temperature (T_{std}):
 Standard Barometric Pressure (P_{std}):
 Air Temperature (T):
 Stack/Duct Pressure (P_g):
 Actual Barometric Pressure (P_{bar}):
 Air Density at Standard Conditions, DRY:
 Duct Shape:
 Duct Diameter:

AIR	
68	(deg. F)
29.921	(in. Hg)
645	(deg. F)
3.00	(in. w.c.)
25.105	(in. Hg)
0.07513	(lbs/ft ³)
CIRC	
62.805	(in.)

% H₂O (by volume)
0.00 (%)

Maximum Differential Pressure:
3.0000 (inches w.c.)

Square Root Extraction? (Yes/No)
No

Output (4-20,0-10,0-5):
4-20 mADC

Calculations:

Stack/Duct Area (A_s): 21.514 (ft²)
 Maximum Actual Velocity: 10.904 (AFPM)
 Absolute Stack/Duct Pressure (P_s): 25.326 (in. Hg)
 Dry Mole Fraction of Stack/Duct (M_{fd}): 1.000
 Dry Molecular Wt. Of Air (M_d): 28.965 (lb/lb-mole)
 Wet Molecular Wt. Of Air (M_s): 28.965 (lb/lb-mole)
 Air Density at Standard Conditions, WET: 0.07513 (lbs/ft³)
 Air Density at Actual Conditions, WET: 0.03039 (lbs/ft³)

% DP (%)	Diff Press (in. w.c.)	Output (mADC)
0	0.0000	4.00
10	0.3000	5.60
20	0.6000	7.20
30	0.9000	8.80
40	1.2000	10.40
50	1.5000	12.00
60	1.8000	13.60
70	2.1000	15.20
80	2.4000	16.80
90	2.7000	18.40
100	3.0000	20.00

Transmitter:

VELTRON II

Flow Element:

IBAM

Transmitter Maximum Range:

0 - 3.00 in w.c.

Power (voltage/type):

24VAC

Power Configuration:

4-Wire

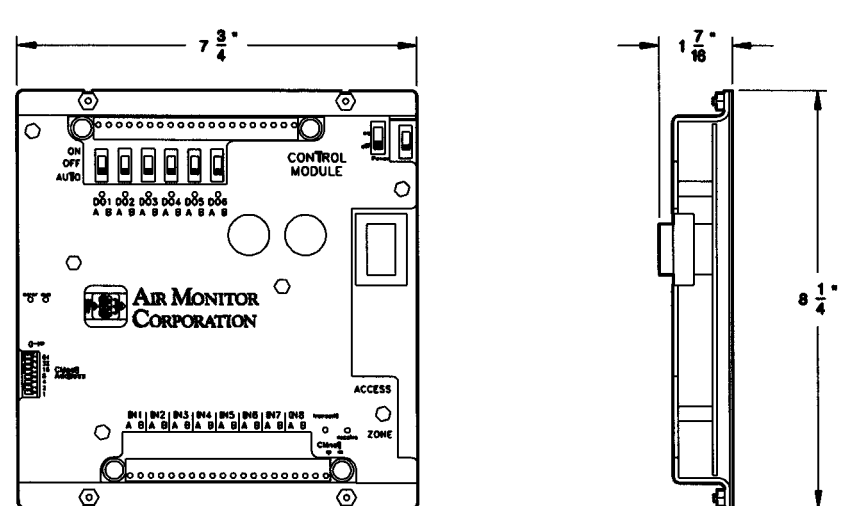
Square Root:

OFF

Display Line #1: **0 - 3.00 in w.c.** (DIFFERENTIAL PRESSURE)

ACTUAL D.P. GENERATED BY IBAM PROBES REQUIRE CORRECTION TO CALCULATE TRUE FLOW

CONTROL MODULE

FEATURES		<ul style="list-style-type: none">• Separate, quick change, plug-in terminal strip for input and output wiring• On/Off power switch on the module• Individual On/Off/Auto switches for relay outputs• Field configurable inputs for 0-5VDC, 4-20mADC, or dry contacts• Factory configured, programmed, and tested Reprogrammable in the field or by remote phone access (requires Communications Module and modem)	
PERFORMANCE SPECIFICATIONS			
Input.	0.1% Resolution	Scan Time.	0.25 second scan cycle time for all inputs and outputs
Output.	0.4% Resolution	Microprocessor.	Motorola MC68HC11
FUNCTIONAL SPECIFICATIONS			
Outputs.	Three analog 0-10VDC Six SPDT relay outputs (Form A), 3 amps maximum @ 24VAC/VDC		
Inputs.	Eight universal inputs (0-5VDC, 4-20mADC, or dry contact)		
Communications.	RS485 port programmable for 9600 to 38.4 kbps		
Memory.	Non-volatile read/write		
Power Supply.	24VAC, 50-60 Hz 20VA maximum Lithium battery provides 10,000 hours of data storage during power outages		
Circuit Protection	Surge protection on input power Optical isolation on RS485 communication line. Arc suppression on relay outputs		
Indication.	LED indicators for status of outputs, power, and communication		
Temperature Limit.	-20°F to 180°F storage -40°F to 150°F operating		
DIMENSIONAL SPECIFICATIONS			
			

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AIR MONITOR CORPORATION

SUB-A002, Rev 2 (10/94)

7.14.2

WARRANTY

PROCESS / POWER

PRODUCTS COVERED

FAN-E/SS
LO-flo/SS
SAP

VOLU-probe/SS
VOLU-probe/SM
SOAP

VOLU-probe/VS-SS
VOLU-probe/FI-SS
STAT-probe/1SS

CA Stations
IBAMS
STACK-probe

WARRANTY

Air Monitor Corporation (hereinafter referred to as "Seller") warrants that at the time of shipment, products sold pursuant to this contract will be free from defects in materials and workmanship, and will conform to the specifications furnished or approved in writing by Seller. No warranty is given that delivered products will conform to catalog sheets, data sheets, and the like, which are subject to change without notice.

Seller will repair or replace, at its option, any products listed under this warranty which is returned freight pre-paid to Seller within the earlier of one (1) year after start-up or fifteen (15) months after shipment that, upon test and examination, proves defective within the terms of this warranty. The warranty period for any item repaired or replaced shall be for the time remaining on the warranty period of the original components. Purchaser shall notify Seller in writing of such defect within sixty (60) days of discovery of the defect.

This warranty does not extend to any product sold by Seller which has been the subject of misuse, neglect, accident, damage or malfunction caused by interconnection with equipment manufactured by others, improper installation or storage, or used in violation of instructions furnished by Seller, nor does it extend to any product which has been repaired or altered by persons not expressly approved by Seller. Nor does Seller warrant equipment against normal deterioration due to environment; nor items such as thermocouples, electrodes, and similar items subject to wear or burnout through usage. Adjustments for items or equipment not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof.

Seller shall not be liable for any special or consequential damages or for loss of damage, directly or indirectly arising from the use of the products. Seller's warranty shall be limited to replacement of defective equipment and shall not include field removal and installation expenses.

The warranty set forth above is in lieu of all other warranties either express or implied and constitutes the full extent of Air Monitor Corporation's liability to the customer, or any other party for breach of warranty. THERE ARE NO EXPRESS WARRANTIES EXCEPT AS SET FORTH HEREIN. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE PARTICULARLY DISCLAIMED.

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AIR MONITOR
CORPORATION

WARR-001, Rev 5 (4/00)

2 18.1

IP7_026251

WARRANTY

PROCESS / POWER

PRODUCTS COVERED

VELTRON II
VEL-trol II
MASS-tron II

VELTRON DPT
VELTRON DPT-plus

MASS-tron II/CEM
CAMM

WARRANTY

Air Monitor Corporation (hereinafter referred to as "Seller") warrants that at the time of shipment, products sold pursuant to this contract will be free from defects in materials and workmanship, and will conform to the specifications furnished or approved in writing by Seller. No warranty is given that delivered products will conform to catalog sheets, data sheets, and the like, which are subject to change without notice.

Seller will repair or replace, at its option, any products listed under this warranty which is returned freight pre-paid to Seller within the earlier of three (3) years after start-up or thirty-nine (39) months after shipment that, upon test and examination, proves defective within the terms of this warranty. The warranty period for any item repaired or replaced shall be for the time remaining on the warranty period of the original components. Purchaser shall notify Seller in writing of such defect within sixty (60) days of discovery of the defect.

This warranty does not extend to any product sold by Seller which has been the subject of misuse, neglect, accident, damage or malfunction caused by interconnection with equipment manufactured by others, improper installation or storage, or used in violation of instructions furnished by Seller, nor does it extend to any product which has been repaired or altered by persons not expressly approved by Seller. Nor does Seller warrant equipment against normal deterioration due to environment; nor items such as thermocouples, electrodes, and similar items subject to wear or burnout through usage. Adjustments for items or equipment not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof.

Seller shall not be liable for any special or consequential damages or for loss of damage, directly or indirectly arising from the use of the products. Seller's warranty shall be limited to replacement of defective equipment and shall not include field removal and installation expenses.

The warranty set forth above is in lieu of all other warranties either express or implied and constitutes the full extent of Air Monitor Corporation's liability to the customer, or any other party for breach of warranty. THERE ARE NO EXPRESS WARRANTIES EXCEPT AS SET FORTH HEREIN. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE PARTICULARLY DISCLAIMED.

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AIR MONITOR
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WARR-002, Rev 4 (4/00)

2.22.1

IP7_026252

From: Jerry Finlinson
To: Salvatore Ferrara
CC: Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hai...
Date: 4/20/2004 11:28 AM
Subject: RE: More ABT burner thermocouple installation difficulties
Attachments: TT Thermocouple head sm.jpg

FYI,

We just tried installing the new 1/16 inch diameter thermocouples on the ABT burners. The thermocouples fit nicely in the existing thermocouple wells. However, there is a problem with how the thermocouple head isn't supported.

Notice in the enclosed photo, how the weight of the thermocouple head is supported only by the thermocouple wire. Then we also need to attach a conduit and cable to the head. This will bend down the thermocouple wire and probably break it eventually. We need to come up with a better attachment or support for the thermocouple head.

Because the thermocouple is brazed into the fitting it's difficult to replace these fittings with a nipple that could support the weight. Would we be able to weld the steel and brass fittings together. Any suggestions?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/27/2004 9:54:01 AM >>>

Jerry,

I ordered 96 replacement thermocouples. They will be 1/16" diameter, simplex type, as shown on attached sketch 10-4881. The shop made a mockup of the tube run and tried a 1/8" diameter thermocouple and it was still very difficult to insert. The 1/16 diameter type inserts easily. We have to go to compression type (spring loaded type doesn't come in 1/16" diameter). The compression fitting will provide adjustability to insure the tip is inserted fully and bottoms out at end of tube. Delivery is being expedited however material takes 2 weeks to acquire. The promised delivery is four weeks (by 4/2/04).

Regards,
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, February 25, 2004 9:57 AM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: ABT burner thermocouple installation difficulties

Sal,

I had my I&C supervisors go out with me to attempt to put the thermocouples into the wells.

IP7_026253

With much struggle and grabbing them with pliers we were able to get the short one in.

We are nervous about damaging the thermocouple sheath.

We also got a 1/8 inch diameter copper rod and inserted it in, it went easier, but was still twisted up. You should specify that the bend radius should not be less than 10 to 12 inches. In the case of the short thermocouple is a bend even necessary? Couldn't the thermowell just be angled down to the spot where it is welded on?

We think at this point that it would be best to switch all the thermocouples to 1/8 inch diameter. Can that be done in the time frame? You can have your guy take a look at it when he is here tomorrow.

We are worried that it's such a struggle to get the 3/16 diameter ones in the pipe that it will be nearly impossible to get them out again. We also don't want to use organic lubricant because it will carbonize in service and make it difficult to reinstall another thermocouple.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/23/2004 3:02:08 PM
>>>

Jerry,
Per my discussion with the PCW fab shop, tubes were bent with 4" centerline radius die. In discussion with the thermocouple supplier, the .312" tube ID with 4" radius bends is sufficient for the .187" diameter thermocouple to pass thru. Our experience with the TC's is they are pretty flexible however they don't just slide in. It takes a little effort to work the TC through the tube but our experience is that they will work through. Twisting, by holding onto the 3/16 sheath at the same time you're pushing in normally helps (just be careful not to twist the head portion of the TC assembly).
Let me know how this works.
Sal

-----Original Message-----
From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]

IP7_026254

Sent: Friday, February 20, 2004 3:51 PM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; Jim Knapp; James Nelson; John Fritzges; Phil Hailes
Subject: ABT burner thermocouple installation difficulties

FYI,

Yesterday, I took one of the thermocouples out and tried sliding it down the thermowells that are installed in the burner. It would only slide in about 13 inches before hitting a tight bend in the thermowell. Apparently your installers are making some sharp corner bends on the thermowell that's making it very difficult to insert.

Have you tried inserting one?
The type E thermocouples that we have are 3/16 inch diameter and don't bend so easy.

Maybe we'll need to get some 1/8 inch diameter thermocouples.

I noticed that there are some sharp bends on the thermocouple out near the tip as well. The bends are only 10 to 15 degrees, but they have a sharp corner, it would have been better to make it very gradual, then the thermocouple would slide in easily.

Please advise on your recommended solution.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026255

From: Matt Maragos <mmaragos@airmonitor.com>
To: Jerry Finlinson <Jerry-F@ipsc.com>
CC: John Thompson <jthompson@airmonitor.com>, Phil Hailes <Phil-H@ipsc.com>, ...
Date: 4/21/2004 9:55 AM
Subject: RE: IPSC B&W burners for IBAM quote
Attachments: IBAM-O Pic.JPG; w40633at.pdf

Jerry,

We have provided burner airflow measurement on this generation of B&W burner in the past with great success. Edgewater 5 (Alliant Energy) has 30 of these burners. They measure in each air zone with our IBAM-O (this is the probe that measures around the inlet). They have totalized the sixty measurements (two air zones per burner) and the sum was to within 5% of the total secondary air.

I have attached a drawing and picture of the IBAM-O.

We will create a proposal and send to your attention soon, but we need a drawing/sketch of the burner. The file you sent earlier had an externally linked TIF file that was not attached. When we open it in AutoCAD and it can't find the referenced file, it simply shows text in place of the missing image. The location and name of that image is all that's displayed (N:\Current\Projects\IGS02\IGS02-14 Boiler Modifications - JHN\6.Documentation\Burner Outline.tif). Would you please send the "burner outline.tif" file?

Please let us know if you have any questions or concerns.

Thank you.

Sincerely,

Matt Maragos
Air Monitor Corporation

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Tuesday, April 20, 2004 2:42 PM
To: mmaragos@airmonitor.com; stevecattani@earthlink.net
Cc: James Nelson; Jon Christensen; Phil Hailes
Subject: IPSC B&W burners for IBAM quote

<< File: Burner Outline.dwg >> << File: U2 E4 Burner 1.JPG >> << File: B2B.JPG >> Matt and Steve,

We are interested in getting a budgetary quote for putting IBAM's on our existing burners on U1.
The system should include purge similar to our new U2 system.

We'd like to get new burners on U1, but may not be able to do it for 3 years, for budgetary reasons,
but we might be able to afford to get IBAM's on the old burners this next spring and then change them

IP7_026256

when we get new burners.

This assumes that we end up liking and valuing the IBAM's on U2 as we get them tuned in and balanced.

Here is a drawing of our burners and some photos of the old U2 burners.

I understand the U1 burners are very similar, but I can't find a photo of them right now.

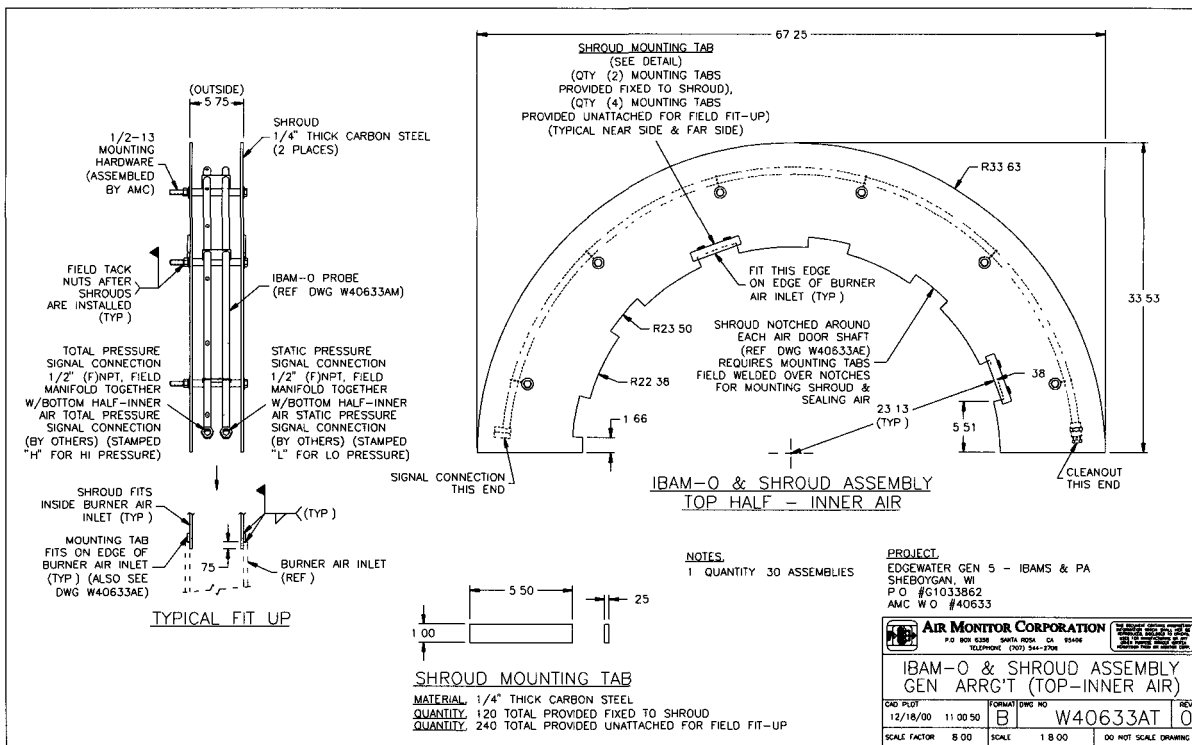
Let me know if you need more info or details to get a quote.

Would you put probes into the burner or would you put a pitot ring around the inlet?

Have you done this type of burner previously?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com



From: Aaron Nissen
To: Howard Scott; Jerry Finlinson
CC: Garry Christensen; James Nelson; Jim Knapp; John Fritzges; Jon Chris...
Date: 4/22/2004 12:26 PM
Subject: Re: IBAM flow checks

Additionally,

U2 C6 is stuck in an auto-purge, hence doesn't have a local display

D1 might want to check if total and static pressure lines aren't swapped around

also need to check the following which have very low diff press:

H5
C4
G5 G3
E1 E6
A1 A5 A6
F2
B2 B4

>>> Jerry Finlinson 4/21/2004 6:14:00 PM >>>
FYI,

We now have the IBAM flows reading reasonably closely into DCS and PI.
Wednesday evening about 69 % of the air was going into IBAMs = 4,000,000 lb/hr.
and about 1,700,000 lb/hr going into primary air flow, which totals up to 5.7 Mlb/hr flow, which is close to the 5.75 Mlb/hr that we are flowing for total air.

There are a couple of problems with the IBAM flows that we need to check.
D1 is reading too low. Can you have someone go check if the dp is reasonable, maybe do a manual purge and check for leaks?
Attach a calibrated cell and see if the dp is reading accurately.

H1 and F6 are reading too high, they seem to be overranged. Could you have someone go attach a dp calibrator to the IBAM Veltron II ports and verify that the dp is really higher than 2 inwc? We may want to consider upgrading the transducer. We have six 5 inch transmitters and we could install two of them in those positions.

F1 appears low.

I'm off on Thursday, but will be back Friday.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026259

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
Date: 4/22/2004 4:18 PM
Subject: RE: Intermountain Ready for OFA CAMS calibration testing

Jerry,

Our service dept will be in touch with you to schedule our next on site visit.

I have not yet had enough time to have the coefficient options reevaluated per your request. It may take us a day or two longer to respond back to you regarding this inquiry.

Thanks for your patience.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 21, 2004 5:03 PM
To: Andy Chew; Dan Beistel; Matt Maragos; hossman@bellsouth.net
Subject: Intermountain Ready for OFA CAMS calibration testing

Dan,

We now have permits to operate and test the OFA on U2.
Could you please schedule a trip back here to do the calibrations?
Sometime in the next 3 or 4 weeks would be good.

Let me know which week is best for your schedule.
It will likely take 2 or 3 days.
I just sent your short probe and calibration box off today.
Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026260

From: Andy Chew <achew@airmonitor.com>
To: "Jerry Finlinson (E-mail)" <Jerry-F@ipsc.com>
Date: 4/26/2004 4:45 PM
Subject: OFA System Startup Technician and Burner Coefficients

Jerry,

AMC servic dept will be calling you soon to arrange for the next site visit. Anytime you need a technician feel free to go directly to them. Call 1-800-AIRFLOW and ask for Chuck Cummins or the service secretary can assist as well.

I gave your request for additional coefficient analysis to my Engineering Manager Paresch Dave' and he was not able to complete what he was working on before leaving on vacation for a week. Can you wait until next week for us to get this done? It may take several hours of playing around with the combinations so let me know if you can wait for us.

Thanks.

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

IP7_026261

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
CC: Paresh Dave <pdave@airmonitor.com>
Date: 4/27/2004 8:58 AM
Subject: RE: OFA System Startup Technician and Burner Coefficients

OK, Thanks Jerry. I think it makes sense to wait and see where the adjustments end up and analyze the test data based upon the real world burner operating conditions and/or perform additional testing to justify use of a (hopefully) simplified coefficient for all points of measurement. Keep us informed.

Thank you.

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 26, 2004 3:56 PM
To: Andy Chew
Subject: Re: OFA System Startup Technician and Burner Coefficients

Thanks for the tip about startup technician.

Well, we can wait for the curve fit. Paresh did call and ask where we finally adjusted our burners, but we aren't finished adjusting them and we'd prefer to have the flow's so that we could adjust them accurately. Right now they have the spin vanes at 45 and 60 degrees, the inner damper at 1 inch and the outer damper at 9 or 10 inches. But they intend to do more adjusting.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 4/26/2004 4:46:14 PM >>>
Jerry,

AMC servic dept will be calling you soon to arrange for the next site visit.

IP7_026262

Anytime you need a technician feel free to go directly to them. Call 1-800-AIRFLOW and ask for Chuck Cummins or the service secretary can assist as well.

I gave your request for additional coefficient analysis to my Engineering Manager Paresh Dave' and he was not able to complete what he was working on before leaving on vacation for a week. Can you wait until next week for us to get this done? It may take several hours of playing around with the combinations so let me know if you can wait for us.

Thanks.

Andy

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
PH 707-521-1709
FX 707-526-2825

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: <tarkel@advancedburner.com>, "Howard Hamilton" <howard-h@ipsc.com>, "How...
Date: 4/27/2004 11:36 AM
Subject: RE: More ABT burner thermocouple installation difficulties
Attachments: 10-4881.tif

Jerry,

TTEC advised that IPSC requested them to change the length of the thermocouples by adding 2" at the factory. I was not aware that this change was made until my discussion today with TTEC. This length change results in the need for additional support of the terminal head as you have discovered (the assemblies that ABT ordered per drawing 10-4881 did not require additional support). I requested that TTEC propose modification to the assembly so that the head is self supported. This will most likely require sending the assemblies back to the TTEC factory.

I asked TTEC to send me their proposal however you can continue to work with them directly if you prefer. Please let me know.

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Tuesday, April 20, 2004 1:28 PM

To: sal@advancedburner.com

Cc: tarkel@advancedburner.com; Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes

Subject: RE: More ABT burner thermocouple installation difficulties

FYI,

We just tried installing the new 1/16 inch diameter thermocouples on the ABT burners.

The thermocouples fit nicely in the existing thermocouple wells.

However, there is a problem

with how the thermocouple head isn't supported.

Notice in the enclosed photo, how the weight of the thermocouple head is supported only by the thermocouple wire.

Then we also need to

attach a conduit and cable to the head. This will bend down the thermocouple wire and

probably break it eventually. We need to come up with a better attachment or support for the thermocouple head.

Because the thermocouple is brazed into the fitting it's difficult to replace these fittings

with a nipple that could support the weight. Would we be able to weld the steel and brass

fittings together. Any suggestions?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624

IP7_026264

435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/27/2004 9:54:01 AM
>>>

Jerry,

I ordered 96 replacement thermocouples. They will be 1/16" diameter, simplex type, as shown on attached sketch 10-4881. The shop made a mockup of the tube run and tried a 1/8" diameter thermocouple and it was

still very difficult to insert. The 1/16 diameter type inserts easily.

We have to go to compression type (spring loaded type doesn't come in 1/16" diameter). The compression fitting will provide adjustability to insure the tip is inserted fully and bottoms out at end of tube.

Delivery is being expedited however material takes 2 weeks to acquire.

The promised delivery is four weeks (by 4/2/04).

Regards,

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Wednesday, February 25, 2004 9:57 AM

To: sal@advancedburner.com

Cc: Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes

Subject: RE: ABT burner thermocouple installation difficulties

Sal,

I had my I&C supervisors go out with me to attempt to put the thermocouples into the wells.

With much struggle and grabbing them with pliers we were able to get the short one in.

We are nervous about damaging the thermocouple sheath.

We also got a 1/8 inch diameter copper rod and inserted it in, it went easier, but was still twisted

up. You should specify that the bend radius should not be less than 10

to 12 inches. In the case of the short thermocouple is a bend even necessary? Couldn't the thermowell just be

angled down to the spot where it is welded on?

We think at this point that it would be best to switch all the thermocouples to 1/8 inch diameter.

Can that be done in the time frame? You can have your guy take a look at it when he is here tomorrow.

We are worried that it's such a struggle to get the 3/16 diameter ones in the pipe that it will

be nearly impossible to get them out again. We also don't want to use organic lubricant because

it will carbonize in service and make it difficult to reinstall another thermocouple.

IP7_026265

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/23/2004 3:02:08 PM
>>>

Jerry,
Per my discussion with the PCW fab shop, tubes were bent with 4" centerline radius die. In discussion with the thermocouple supplier, the .312" tube ID with 4" radius bends is sufficient for the .187" diameter thermocouple to pass thru. Our experience with the TC's is they are pretty flexible however they don't just slide in. It takes a little effort to work the TC through the tube but our experience is that they will work through. Twisting, by holding onto the 3/16 sheath at the same time you're pushing in normally helps (just be careful not to twist the head portion of the TC assembly).
Let me know how this works.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, February 20, 2004 3:51 PM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; Jim Knapp; James Nelson; John Fritzges; Phil Hailes
Subject: ABT burner thermocouple installation difficulties

FYI,

Yesterday, I took one of the thermocouples out and tried sliding it down the thermowells that are installed in the burner. It would only slide in about 13 inches before hitting a tight bend in the thermowell. Apparently your installers are making some sharp corner bends on the thermowell that's making it very difficult to insert.

Have you tried inserting one?

The type E thermocouples that we have are 3/16 inch diameter and don't bend so easy.

Maybe we'll need to get some 1/8 inch diameter thermocouples.

I noticed that there are some sharp bends on the thermocouple out near the tip as well.

IP7_026266

The bends are only 10 to 15 degrees, but they have a sharp corner, it would have been better to make it very gradual, then the thermocouple would slide in easily.

Please advise on your recommended solution.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

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IP7_026267

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: <tarkel@advancedburner.com>, "Howard Hamilton" <howard-h@ipsc.com>, "How...
Date: 4/28/2004 7:56 AM
Subject: RE: More ABT burner thermocouple installation difficulties
Attachments: TTECQuote.tif

Jerry,

Attached is quote and drawing revision for factory modification of the thermocouples to return to a self supporting head design. An alternative would be to run rigid conduit in the field that is fixed close to the connection at the head, and have the conduit support the head. This alternative eliminates the need to sent the thermocouple back to the factory however I don't know which is the more cost effective solution.

Sal

-----Original Message-----

From: Sal Ferrara [mailto:sal@advancedburner.com]
Sent: Tuesday, April 27, 2004 1:34 PM
To: Jerry Finlinson
Cc: tarkel@advancedburner.com; Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: More ABT burner thermocouple installation difficulties

Jerry,

TTEC advised that IPSC requested them to change the length of the thermocouples by adding 2" at the factory. I was not aware that this change was made until my discussion today with TTEC. This length change results in the need for additional support of the terminal head as you have discovered (the assemblies that ABT ordered per drawing 10-4881 did not require additional support). I requested that TTEC propose modification to the assembly so that the head is self supported. This will most likely require sending the assemblies back to the TTEC factory.

I asked TTEC to send me their proposal however you can continue to work with them directly if you prefer. Please let me know.

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-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Tuesday, April 20, 2004 1:28 PM
To: sal@advancedburner.com
Cc: tarkel@advancedburner.com; Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: More ABT burner thermocouple installation difficulties

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However, there is a problem

with how the thermocouple head isn't supported.

Notice in the enclosed photo, how the weight of the thermocouple head is supported only by the thermocouple wire.

Then we also need to

attach a conduit and cable to the head. This will bend down the

IP7_026268

thermocouple wire and probably break it eventually. We need to come up with a better attachment or support for the thermocouple head.

Because the thermocouple is brazed into the fitting it's difficult to replace these fittings with a nipple that could support the weight. Would we be able to weld the steel and brass fittings together. Any suggestions?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/27/2004 9:54:01 AM
>>>

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Regards,
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, February 25, 2004 9:57 AM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: ABT burner thermocouple installation difficulties

Sal,

I had my I&C supervisors go out with me to attempt to put the thermocouples into the wells. With much struggle and grabbing them with pliers we were able to get the short one in. We are nervous about damaging the thermocouple sheath.

We also got a 1/8 inch diameter copper rod and inserted it in, it went easier, but was still twisted up. You should specify that the bend radius should not be less than 10 to 12 inches. In the case of the short

thermocouple is a bend even necessary? Couldn't the thermowell just be angled down to the spot where it is welded on?

We think at this point that it would be best to switch all the thermocouples to 1/8 inch diameter. Can that be done in the time frame? You can have your guy take a look at it when he is here tomorrow.

We are worried that it's such a struggle to get the 3/16 diameter ones in the pipe that it will be nearly impossible to get them out again. We also don't want to use organic lubricant because it will carbonize in service and make it difficult to reinstall another thermocouple.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

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>>>

Jerry,
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Let me know how this works.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, February 20, 2004 3:51 PM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; Jim Knapp; James Nelson; John Fritzges; Phil Hailes
Subject: ABT burner thermocouple installation difficulties

IP7_026270

FYI,

Yesterday, I took one of the thermocouples out and tried sliding it down the thermowells that are installed in the burner.

It would only slide in about 13 inches before hitting a tight bend in the thermowell. Apparently your installers are making some sharp corner

bends on the thermowell that's making it very difficult to insert.

Have you tried inserting one?

The type E thermocouples that we have are 3/16 inch diameter and don't bend so easy.

Maybe we'll need to get some 1/8 inch diameter thermocouples.

I noticed that there are some sharp bends on the thermocouple out near

the tip as well.

The bends are only 10 to 15 degrees, but they have a sharp corner, it would have been better to make it very gradual, then the thermocouple would slide in easily.

Please advise on your recommended solution.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

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IP7_026271

350 New Street
Quakertown, Pa. 18951
Phone: 215 529-9394
Fax: 215 529-9397
www.tteonline.com

THERMOCOUPLE TECHNOLOGY, INC.

Fax

To: ADVANCED BURNER TECHNOLOGY / SAL

From: Ed Maile

Fax: 908-470-0479

Pages: 2

Phone: 908-470-0479

Date: 27 April 2004

Re: TYPE E THERMOCOUPLES

CC: BILL BIERNE

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

GOOD AFTERNOON SAL,

48 PCS T-TEC # 10-4881REV.2-1 (MODIFY T/C'S *) \$53.25 NET/EA

48 PCS T-TEC # 10-4881REV.2-2 (MODIFY T/C'S *) \$53.25 NET/EA

*TO ADD 1/4" X 6" SUPPORT TUBE TO EXISTING THERMOCOUPLES.

PLEASE VERIFY 1/4" O.D. SUPPORT TUBE LENGTH OF 6" IS ACCEPTABLE. COMPRESSION FITTING IS ADJUSTABLE ALONG THIS LENGTH.

SHIPMENT: 5 - 7 WORKING DAYS AFTER RECEIPT OF RETURNED THERMOCOUPLES.

PLEASE REF OUR QUOTATION # 10427EM3

THANK YOU

HAVE A GOOD NIGHT

ED

**** VISA, MASTERCARD & AMERICAN EXPRESS ACCEPTED ****

IP7_026272

Type E Simplex
With Compression
Fitting Loose

Item	Unit Length
1	62 $\frac{1}{4}$ "
2	105 $\frac{9}{16}$ "

Rev.	Date	Change
REV 1	3/11/04	Added 12" to both
		17 PINS
REV 2	4/12/04	Added 14" OD &
		6" Spine to Outer

Thermacouple Technology, Inc.
350 New Street
Quakertown, PA 18951
Tel: 610-339-3004 Fax: 715-579-9197 www.tlcconline.com

Phone: 213-329-7374 Fax: 213-329-7375	Date: 2/26/04	Drawn by: ELL
		Approved by:
Scale: 0-		

Type E Simplex Thermocouple

From: <james.m.clark@us.abb.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: <harry.dohalick@us.abb.com>, "Jim Knapp" <JIM-KNAPP@ipsc.com>, <william....>
Date: 4/28/2004 12:22 PM
Subject: Intermountain Scanners -- Spares Info & Return

Hello "Jerry -- ABB has already shipped the required/recommended spares based on the system components and quantities specified. Here is the list with ABB p/n's:

ABB P/N	System Material	Qty
C10-92296-LP	Scanner heads	48
902-2491-AA	Rigid guidepipes	48
C10-97252-50	50 ft. Cable Adapter	48
C13-94502	Chassis/3ch Rear Access	16
C10-97383	SensorModuleCommServer	4
C10-98523	Encl/Nema 12, F/R Acc.	2
C10-97488	Packing gland/3 inch	48

ABB P/N	Spares Shipped	Qty
C10-92296-LP	Scanner heads	4
C10-97252-50	50 ft. Cable Adapter	6
C86-94639	Sensor Modules	4
C86-80741	Power Supply	3
C32-32012	Fuses	6

Please swap out the faulty component and replace with spare already provided. Return the faulty component to me for warranty replacement/repair. Please send to the following address:

ABB Inc.
2 Waterside Crossing -- Suite 200
Windsor, CT 06095

Att: Jim Clark
IPSC RMA #1

I trust this answers all your questions. Regards -- Jim

Message from "Jerry Finlinson" <Jerry-F@ipsc.com> received on 04/28/2004 12:27 PM

04/28/2004 "Jerry Finlinson" <Jerry-F@ipsc.com>
12:27 PM
Sent by "Jerry Finlinson" <Jerry-F@ipsc.com>

To: James M. Clark/USIMS/ABB@ABB_US01

IP7_026274

cc: "Jim Knapp" <JIM-KNAPP@ipsc.com>, Harry
Dohalick/USINY/ABB@ABB_US01, Mike Tolar/USPOA/ABB@ABB_US01
Subject: Intermountain power parts list

James,

I'm working with our instrumentation planner, Jim Knapp, to put together a flame scanner spares list.

Could you send us an itemized parts list of all the parts that we have received and a list of recommended spares? I think you already provided most of the recommended spares.

We want to create in house stock numbers that correlate to your part numbers, so that we can order parts quickly when necessary.

We have one scanner that doesn't work, we can't get the dark furnace adjustment to adjust properly.
When Mike Tolar was here he suggested to contact you and see if you prefer to exchange to entire scanner to ship us a new scanner head board and have us exchange that and see if that is sufficient.
What do you want to do there?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026275

From: Ron Taylor
To: Jerry Finlinson
Date: 4/28/2004 2:29 PM
Subject: Re: Weld repair of tubing on burner front

Done. Work order written. Gave it to Scheduling.

>>> Jerry Finlinson 4/28/2004 7:56:40 AM >>>

Ron,

Could you write a work order for a welder to repair some leaks in the black iron piping on the burner front.

At this time we know of 2 leaks in the B2 burner air flow tubing.
We will check and see if we can find any others.

It is black iron piping - carbon steel.

The tubing is under a pressure of under 1 psi, so we should be able to weld it online with no problems.

If neccessary we can disconnect the tubing from the burner during the weld repair time.

Have them contact me when ready to start and I'll direct them to the leaks.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026276

From: Ron Taylor
To: Jerry Finlinson
Date: 5/4/2004 11:57 AM
Subject: Re: Weld repair of tubing on burner front

Jerry - update on work order..... So far it is tentatively scheduled for May 11th.... that's next Tuesday. Hope that's ok with you.

Ron T.

Done. Work order written. Gave it to Scheduling.

>>> Jerry Finlinson 4/28/2004 7:56:40 AM >>>
Ron,

Could you write a work order for a welder to repair some leaks in the black iron piping on the burner front.

At this time we know of 2 leaks in the B2 burner air flow tubing.
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Have them contact me when ready to start and I'll direct them to the leaks.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026277

From: Andy Chew <achew@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>
Date: 5/4/2004 4:24 PM
Subject: RE: Curve fits for IBAM probes

Jerry,

I too would have expected that a 30° spin vane setting would allow substantially less air through the burner, with a much lower generated probe DP, than when the spin vane setting was positioned at 60°, but that is not the case. If you look back at the test data results and compare (for instance) run 1 with run 25 you can see that the flow rate difference is very small (albeit there was a small difference in fan speed) but otherwise this behavior repeats itself on other runs with similar settings with the only difference in burner settings being spin vane position.

Give Paresh a call when you have a moment and we can discuss this in more detail.

Regards,

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Tuesday, May 04, 2004 12:08 PM
To: Andy Chew; Paresh Dave
Cc: Aaron Nissen; Garry Christensen; James Nelson
Subject: Curve fits for IBAM probes

Andy and Dave,

I assembled the 9 curve fit equations as you suggested in the enclosed spreadsheet.

They are within 3 or 4 percent of each other.

However, it seems that the trend is wrong. I would expect the 30 degree spin vane angle to have lower flows than the 60 degree spin vane angle, all else being equal. How can you explain this?

Thanks, Jerry

All three spin vane settings listed
(30°, 45° and 60°) are in degrees open from the closed position. i.e. 0° is closed and 90° is full open.

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026278

From: Bernell Warner
To: Jerry Finlinson; mmaragos@airmonitor.com
Date: 5/11/2004 10:51 AM
Subject: burner drawing
Attachments: Burner Outline.dwg; Burner Outline.tif

From: Matt Maragos <mmaragos@airmonitor.com>
To: Bernell Warner <BERNELL-W@ipsc.com>, Jerry Finlinson <Jerry-F@ipsc.com>
Date: 5/11/2004 11:06 AM
Subject: RE: burner drawing

Received. Thank you.

Jerry - We will get back to you shortly with a proposal.

-----Original Message-----

From: Bernell Warner [mailto:BERNELL-W@ipsc.com]
Sent: Tuesday, May 11, 2004 9:52 AM
To: mmaragos@airmonitor.com; Jerry Finlinson
Subject: burner drawing

<< File: Burner Outline.dwg >> << File: Burner Outline.tif >>

From: Aaron Nissen
To: Howard Scott
CC: Garry Christensen; Jerry Finlinson; Jim Knapp; John Fritzges
Date: 5/12/2004 7:14 AM
Subject: U2 Burner Setup & Tuning

Howard;
Could you tell me status for the U2 O2 probe calibrations and C feeder calibration?

Thanks
Aaron

+++++

U2 Burner Setup & Tuning

Punchlist Items: for the week of 5/10/04

U2 O2 probe- I&C support WOR# 103889

Problem- U2 probe #6 & #7 consistently is reading high (up to 1.5%) O2
need to look for air in- leakage, check/ replace O2 probe gasket seal

U2 C coal feeder- I&C support WOR# 103888

Problem- Pulv/ feeder isn't performing correctly, high coal bias & PA flow bias plus loads up
Conduct loop feeder calibration check thru CCS, feeder has been calibrated twice since Outage
need to check not only locally but back thru CCS, does the feeder with calibration chain read
indicated coal flow in the control system (check electronics- A to D conversion cards, etc.)

U2 Controls Tuning Jerry-F/ Bill-M

Have problem getting steady state conditions for burner tuning, see O2 fluctuations of up to 2.0%
Operations went to high speed on the PA fans to help prevent pulverizers from loading up,
but see problems with feedwater flow variations (drum level transmitters recently calibrated)
as well as main steam sprays variations (recent- controls tuning and setup work has helped this
problem)

U2 Econ Gas Exit Temp 2SGAPX3015 I&C

Problem- EGOT reading 40F lower than Prim RH & Prim SH-Econ exit gas temps
Check T/C's and swamp box for bad inputs

U2 Overfire Air CAMS calibration Jerry-F

Need to calibrate the new Air Monitor CAMS system and apply K factors. Place OFA system in-service
to traverse all four inlets at various OFA flows.

Sec Air/ Windbox Dampers Garry-C/ Dave-S/ Phil-H

Problem- east to west O2 unbalance, looking for dampers not aligned (east to west match) or linkages
bound up

Set pulv to manual, run SA dampers 100% and mark all damper shafts, verify positions at minimum and
then stroke dampers to check movement

Backpass Gas Bias Dampers (Prim RH & Prim SH- Econ) Garry-C/ Dave-S/ Phil-H

Problem- east to west O2 unbalance, looking for damper groups not working, pushing gas flow east or
west

Set dampers to manual, run dampers 100% and mark all damper shafts, verify positions at minimum and
then stroke dampers to check movement

U2 PI points Garry-C/ James-B

Add PI Points, need Sec Air/ Windbox Dampers Bias positions added from CCS

IP7_026281

SO2 Inlet- differences between U1 & U2 Envir Group

Problem- Scrub SO2 Inlet U1 445 ppm, U2 355ppm 5/10/04 (both units at 950 MW gross, burning same coal)

(had a huge spread over the weekend)

Please calibrate/ recouple differences

From: Janet Bauman <jbauman@airmonitor.com>
To: "Jerry-F@ipsc.com" <Jerry-F@ipsc.com>
CC: Dan Beistel <dbeistel@airmonitor.com>
Date: 5/26/2004 9:38 AM
Subject: Intermountain Report
Attachments: Intermountain Report.PDF

Jerry,

This report is being forwarded to you on behalf of Dan Beistel. If there are any questions regarding the content of the report contact Dan (mailto:dbeistel@airmonitor.com) or phone 919-523-9680.

Regards,
Janet Bauman
Service Coordinator
Air Monitor Corporation
707-544-2706 ext 743

<<Intermountain Report.PDF>>

IP7_026283



**AIR MONITOR
CORPORATION**

Field Service Visit Report

☐ Additional paperwork attached

Work Order Number **50600**

Field Service Report # **1** of **1**

Contact Information and Service Location

Name Jerry Finlinson Office Phone 435-864-6466
Firm IPSC
Name _____ Office Phone _____
Firm _____
Project PA Traverse WO# 50271 Location Delta, UT

Service Activity

Problem Description or Service Request

Traverse 8 mills to verify airflow

Service Actions Taken

Performed the required traversing. The traverse results accompany this report. The OFA ducts take off the top of the wind box at each corner of the boiler. Each OFA duct feeds multiple OFA nozzles. The OFA ducts have no turning vanes, thus the airflow profile is skewed toward the top of the OFA duct at the point where the traversing was performed and where the airflow measurement probes are installed.

Based upon the results of the traversing, the customer requested that K-factors be applied to all CAMM's

Primary reason for service visit:

☒ Traversing Service

☐ Start-up

☐ Installation

☐ Other

☐ Repair

Was preventive maintenance service performed during this visit?

☐ Yes

☒ No

Service Repair Codes

--	--	--	--	--

Service Representative Signature Dan Beistel

Date 5/19/04

Instrument and Billing Information

Instruments _____
SNs _____
SNs _____
Billing Status ☐ Warranty ☐ Contract ☐ Billable
☐ Start-up - paid ☐ Other

Labor and Parts

Total Travel Time 12 hours

On Site Dates Start 5/11/04 End 5/13/04

Labor

Regular Days On-site	<u>3</u>	Overtime Hours	
Saturday/Sunday/Holidays		Double Time Hours	

Part Number	Qty	Description	Code
* *			
* *			
* *			
* *			

Call Resolution

Is this Service Call closed? ☒ Yes ☐ No

Describe follow up action required if the call is to remain open

Note: Travel Expenses and Applicable State Sales Taxes will be added to the total amount billed.

Customer Signature _____

Date _____

IP7_026284



AIR MONITOR
CORPORATION

Field Service Visit Report Addendum

Work Order Number

Addendum Sheets for Field Service Report # _

Additional Information:

From: Janet Bauman <jbauman@airmonitor.com>
To: "Jerry-F@ipsc.com" <Jerry-F@ipsc.com>
CC: Dan Beistel <dbeistel@airmonitor.com>
Date: 5/26/2004 10:15 AM
Subject: Transducers

Jerry,

I apologize for sending you the wrong report yesterday. Your report was sent this morning.

Another matter that I need to follow up on is the transducers we sent out to you in April. We have never received the exchanged units. Five 5" transducers were sent to replace five 2" transducers. I need these back to clear out the work order. If these units are not returned there will be a charge of \$1950. Please advise.

Regards,
Janet Bauman
Service Coordinator
Air Monitor Corporation
707-544-2706 ext 743

IP7_026286

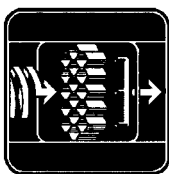
From: Ken Hall <khppquip@earthlink.net>
To: Jerry Finlinson <Jerry-F@ipsc.com>
CC: Steve Cattani <stevecattani@earthlink.net>
Date: 7/9/2004 9:24 AM
Subject: IBAM's for B&W Burners
Attachments: 070104-1.1 Intermountain IBAMS Proposal.pdf; IBAM-O Submittal - SAMPLE.PDF; IBAM-O Mounted in Burner - SAMPLE.pdf; IBAM-O Pic.JPG

Jerry:

Per IPP's request to Steve Cattani for Air Monitor to quote Individual Burner Air Flow Measurement for the existing B&W Burners on Unit #1 please see the attached quote. In order to measure the existing B&W burner it requires to purges and two sets of electronics per burner. This doubles the cost per burner compared to the ABT burners. If you review the attachments it becomes clear there is a lot more hardware to be supplied on the measurement of the B&W burner vs the ABT. Steve Cattani and I will call you next week to review the proposal.

Thank you for the opportunity to provide you with this quote. If you have any question prior to our phone call please call Steve or myself.

IP7_026287



AIR MONITOR CORPORATION

Email/FAX TRANSMISSION

Date: July 1, 2004

No. of Pages: 3
(includes this page)

TO: Jerry Finlinson Intermountain Power	FROM: John Thompson Sales Applications Engineer Air Monitor Corporation 8816 Six Forks Road, Suite 209 Raleigh, NC 27615
CC: Steve Cattani – PowerQuip	
Fax: Phone:	Fax: 919 844 3105 Phone: 919 844 3100 X14

REMARKS: ☒ URGENT ☒ FOR YOUR REVIEW ☐ PLEASE COMMENT

RE: Improving Plant Efficiency with Individual Burner Airflow Measurement
Proposal # 070104-1.1

Mr. Finlinson:

Please find this proposal for Air Monitor's Individual Burner Airflow Measurement system for use at Intermountain Power

Low NOx Burner Airflow Measurement for Forty-Eight (48) Burners

Air Monitor's systems provide accurate combustion airflow measurement to each burner. Air Monitor systems provide the means to accurately balance and/or bias burner stoichiometries to lower NOx levels, reduce LOI, and increase overall boiler performance.

Benefits of Air Monitor's Accurate Burner-to-Burner Secondary Airflow (SA) Measurement:

- Accurate SA measurement to each burner will allow for airflow balancing or biasing on a burner by burner basis
- Air Monitor equipment provides accurate measurement through 10:1 turndown, resulting in improved emissions at all operating loads
- Air Monitor's Individual Burner Airflow Measurement will provide for improved burner stoichiometry and improved plant performance through decreased NOx, improved LOI, etc.
- Air Monitor's Patented IBAMO (Probe) will provide an accurate measurement suitable for future use in conjunction with a neural network or other online combustion optimization systems.

The burner wind tunnel test has a matrix of swirler angle and load for each register. As the operational ranges of the swirler angle and load vary from facility to facility, we are providing a quotation for a typical burner test. A typical burner wind tunnel test has a matrix of swirler angles and loads that will cover a minimum of 48 test points.

Based on our testing experience, this matrix (range) will be sufficient for most operational configurations. If it is found that the operational range extends outside of our standard matrix, this can be expanded.

Expansion of the wind tunnel testing may result in additional cost. The wind tunnel testing and burner mock up is included with the IBAM probes. No CFD analysis is required or included.

The IBAMs quoted below are required for the burner airflow measurement. The VELTRON IIs must be used if a 4-20 mA output is desired. The AUTO-purge III will insure continuous operation of the probes without the inaccuracies caused by pluggage from fly ash in the air stream. No interconnect tubing is included.

IBAMO Burner Probes – Two per Burner

The IBAMO burner probe, derived from the patented VOLU-probe technology, utilizes the Pitot-Fechheimer principle together with its patented chamfered total pressure port and is ideal for existing burner retrofits of the older B&W Dual Register Burners. It is designed for mounting around the circumference of the burner inlet. Constructed entirely of 316 Stainless Steel, the IBAMO burner probe is suited for clean or harsh and particulate laden applications, operating at temperatures ranging from -20 to 900°F. Process connection fittings are ½" FPT.

Price for Forty-Eight (48) Sets of IBAMO Probes (96 probes) \$263,904.

The above price includes the complete cost of a burner mock up and wind tunnel test.

VELTRON II Flow Computer/Transmitter – Two per Burner

The VELTRON II is designed to accurately measure the low differential pressures measured by the IBAM probes located in the Low NOx Burners. A standard four-line backlit LCD is provided for the calibration and configuration process and to display output data. The system is accurate to within ±0.1% of span and can maintain linear output signals over a 10 to 1 flow turndown. The VELTRON II utilizes an AUTO-zero circuit to eliminate the need for re-calibration due to thermal, mechanical, and electrical drift effects on zero. The VELTRON II is mounted in a NEMA 4 enclosure with viewing window.

AUTO-purge III – Two per Burner

The AUTO-purge III is the automatic blowback system to protect against any degradation in performance of the duct mounted measurement devices due to the presence of airborne particulate. The AUTO-purge utilizes pneumatically shuttled valves that isolate the VELTRON II transducer and allow 80-125 psig instrument air at 100 CFM to be directed to the VOLU-probes. The AUTO-purge III is mounted in a NEMA 4 enclosure.

Six sets of VELTRON IIs and AUTO-purge IIIs will be grouped together in a single Nema 4 enclosure. Two of these enclosures will be supplied for each burner deck.

Price for 16 Enclosures/Ninety-Six sets of VELTRON II & AUTO-purge III Systems \$397,080.

Factory technician start up assistance is required for this project and is included in the above price for the VELTRON IIs and AUTO-purges. An Air Monitor Factory technician will be on site to ensure that the equipment is properly connected and calibrated (spanned). The factory technician will train on site personnel in the operation of Air Monitor products.

All prices in United States Dollars

Shipping Schedule: 10-12 weeks after approval of submittal drawings or order release. Submittal drawings will be completed within 3 weeks after receipt of order.

Terms: Net 30 Days
F O B: Santa Rosa, CA.

This proposal is valid for sixty days.

Thank you for your interest in Air Monitor's systems.

If you have any questions or comments, please do not hesitate to contact us

Sincerely,

John Thompson
Air Monitor Corporation

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Sincerely,

John Thompson
Air Monitor Corporation

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From: VALERIE ALLEY
To: JERRY FINLINSON
Date: 8/3/2004 12:38 PM
Subject: Work order 03-96033-45 Has been Closed

WELD REPAIR LEAKS IN THE FLOW MONITOR AIR LINES TO THE NEW ABT BURNERS IN UNIT-2.

Work assigned to crew 57

Total Hours 16.00

Total Material Cost 0.00

From: Jerry Finlinson
To: Aaron Nissen; Dave Spence; Garry Christensen
CC: Bill Morgan; James Burr; Jerry Finlinson; Ken Nielson; Steve Higgs
Date: 2/10/2005 4:23 PM
Subject: U2 IBAM Flows working again.

FYI,

Thanks to some excellent sleuthing by Steve, Ken and James, they figured out that somehow all the tagnames of the IBAM points were changed on 19Nov04, and they have not been updating since then. They were corrected today and are all working now.
Thanks to Garry for pointing it out.

We lowered the update and archive accuracy to 0.2% and 0.5%. It's unlikely that they are more accurate than that.

Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026292

From: Ken Nielson
To: Aaron Nissen; Bill Morgan; Garry Christensen; James Burr; Jerry Finl...
Date: 2/11/2005 2:54 PM
Subject: IBAM point corrections

To all concerned,

Garry was checking the IBAM points today and found that the actual flow points were not updating. The IBAM points corrected yesterday (removal of the leading "U" in the path tagname) was only applicable to the DP points. The actual flow points required the leading "U". This was added back in and they are now working.

Let me know if there are questions or concerns.

Thanks,
Ken N.

From: Matt Maragos <mmaragos@airmonitor.com>
To: 'Jerry Finlinson' <Jerry-F@ipsc.com>, <khpquip@earthlink.net>
CC: 'Jim Knapp' <JIM-KNAPP@ipsc.com>
Date: 2/18/2005 10:08 AM
Subject: RE: IPSC burner pitot's manifold broken

Jerry,

I would need to inspect the damaged units to determine mode of failure and potential warranty.

I will get you a quotation for spares shortly.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, February 18, 2005 8:50 AM
To: mmaragos@airmonitor.com; khpquip@earthlink.net
Cc: Jim Knapp
Subject: IPSC burner pitot's manifold broken

FYI,

Here are some photos of the manifold on back of the D1 burner. Turns out both the high and low pressure lines broke, so we were not aware of the problem.

Maybe we should get a spare pitot, so that we could replace them in this situation. They are trying to do a weld repair, but I'm not sure how well it is going. I'm not sure what caused the breakage. Likely vibration, any other ideas.

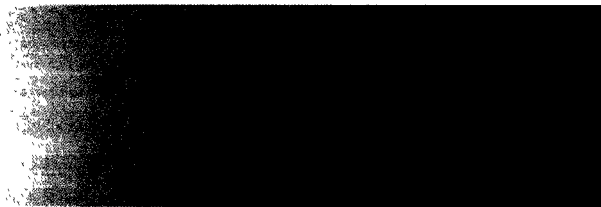
Any warranty coverage. How much does it cost to get some spare pitots?

Later, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026294

From: Matt Maragos <mmaragos@airmonitor.com>
To: Jerry Finlinson <Jerry-F@ipsc.com>
CC: Ken Hall <khpquip@earthlink.net>
Date: 2/23/2005 8:54 AM
Subject: Quotation for Spare/Repl IBAMs & VOLU-probes
Attachments: 022305 Intermountain Power - Spares_Repls.pdf



Date: February 23, 2005
No of Pages 2
(includes this page)

To: Jerry Finlinson Intermountain Power	From: Matt Maragos AMC Power
Fax:	Fax: (707) 526-9970
Phone: (435) 864-6466	Phone: (707) 521-1731
E-Mail: Jerry-F@ipsc.com	E-Mail: mmaragos@airmonitor.com
cc: Ken Hall – PowerQuip	

☐ URGENT

☒ FOR YOUR REVIEW

☐ PLEASE COMMENT

RE: Spare/Replacement IBAM Probe and OFA VOLU-probes
Proposal Number: 022305-10.1

Jerry,

Per your request, please this proposal for the spare / replacement IBAM probes and OFA probes.

We have provided pricing for both a stainless steel OFA probe (exact replacement for the existing probes) and for an OFA probe constructed of Inconel. Inconel material is good for operational temperatures up to 1900°F (the 316 stainless steel is rated to 900°F).

Price for One (1) IBAM Probe (316 Stainless Steel Construction) \$695.

Price for One (1) 39.5" OFA VOLU-probe/1SS (316 Stainless Steel Construction)\$920.

Price for One (1) 39.5" OFA VOLU-probe/1SS-SPL (Inconel Construction).....\$1 ,590.

All prices in United States Dollars.

Shipping Schedule: 6-8 weeks after approval of submittal drawings or order release. Submittal drawings will be completed within 3 weeks after receipt of order.

Terms: Net 30 Days.
F.O.B: Santa Rosa, CA.

This proposal is valid for 60 days.

Proven solutions for a tough industry

IP7_026296

If you have any questions or comments, please do not hesitate to contact us.

Sincerely,

Matt Maragos
AMC Power

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Proven solutions for a tough industry

IP7_026297

From: "Ken Hall" <khpquip@earthlink.net>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 3/2/2005 6:37 AM
Subject: RE: Air Monitor meeting Thursday morning or afternoon OK.
Attachments: Ken Hall (khpquip@earthlink.net).vcf

Thank for the insight.

Thank you,

Ken Hall, PowerQuip
Office: 801 546 6262
Cell: 801 725 5537
Fax: 801 544 1504

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, February 28, 2005 4:32 PM
To: khpquip@earthlink.net
Subject: RE: Air Monitor meeting Thursday morning or afternoon OK.

Aaron's problem with the IBAM's is that they set up the burners using the IBAM's and thought they had the flows well balanced. They also had a grid of O2 and CO sensors in the backpass. They found that there were still major spikes of CO and O2, so they had to adjust the burners using their CO grid, but didn't find the IBAM's very useful. So they wonder how accurate they really are.

We'll talk more Thursday.
Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Ken Hall" <khpquip@earthlink.net> 2/28/2005 2:41:57 PM >>>
Jerry:

Thank you very much for re-scheduling our meeting. We will be on site Thursday March 3rd at 8:30 am to meet with you and Aaron. Dean Debaun, Dave Earley, Steve Cattani and my self will attend the meeting.

Please call me if you have any questions.

Thank you,

Ken Hall, PowerQuip
Office: 801 546 6262
Cell: 801 725 5537
Fax: 801 544 1504
-----Original Message-----

IP7_026298

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, February 28, 2005 2:21 PM
To: khpquip@earthlink.net
Subject: Air Monitor meeting Thursday morning or afternoon OK.

Ken,

I talked with Aaron and he agreed it would be OK to change our IBAM meeting with Air Monitor from Wednesday to Thursday. We have an outage planning meeting that we need to attend from 10-11am. So you should plan to come in around 8:30 or 9am, or wait until 12:30pm. Let us know which you prefer.
Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

From: Jerry Finlinson
Start: 5/25/2005
Due: 5/25/2005
Subject: Found leaks on D1, D2 burner. Kirk Harris doing weld repair.

Difficult since a weld melts solder out near weld, and must have power turned down very low to avoid melting tubing.

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 6/1/2005 9:19 AM
Subject: RE: IPSC U2 Burner IBAM silver brazing failure

Jerry,
I don't mean to keep you hanging. I am looking into this and will respond back with our recommendation as soon as possible.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, May 26, 2005 10:18 AM
To: sal@advancedburner.com; tarkel@advancedburner.com; mmaraos@airmonitor.com; khpquip@earthlink.net
Cc: Aaron Nissen; Bill Morgan; Garry Christensen; Howard Scott; Jerry Finlinson; Jim Knapp; John Fritzges; Jon Christensen; Ken Nielson; Nathan Crop; Pam Bahr
Subject: IPSC U2 Burner IBAM silver brazing failure

FYI,
During our Feb05 unit 2 outage I went in to inspect the D1 burner which had a bad IBAM signal. At that time we found 2 broken manifold pipes. They were weld repaired, but the signal was still bad. So this week during our tube leak outage, I went in to inspect and found those weld repairs still good, but there were 6 other leaky fittings in the stainless steel couplings and T's. This was originally silver brazed by Advanced Burner at their manufacturing shop. We found many leaks upon delivery and they were rebrazed on site.

Now we find that apparently that brazing material is not holding up to the 700 F temp in the secondary air windboxes and new leaks are developing. PCW's assurances that the joints were all good and will not leak has proven to be incorrect. So we need to remedy the situation. We'll need to plan a major project to go in on the next major outage and do a proper weld on all those fittings. What type of weld would you advise? Heliarc?

Do you provide warranty coverage for this type of failure?

Please advise.

Below is some emails that we exchanged on the original problem in Feb 2004. At that time we were advised by ABT that silver brazing would be able to withstand temps up to 1100 F. Notice in the enclosed photos that the brazing appears to be flaking off on the outside. Also when our guys do a weld on one side of the fitting then the brazing melts out on the otherside, so they

IP7_026301

must do it
all the way around.

Jerry

Jerry,

I am sure you will let us know what ABT proposes to remedy the tubing joint leaks.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Thursday, February 05, 2004 5:46 PM

To: sal@advancedburner.com; Bill Morgan; Howard Hamilton; James Nelson; Ken Nielson; Phil Hailes

Cc: Andy Chew; Matt Maragos; khpquip@earthlink.net

Subject: ABT burner pitot manifold leak photos - AMC WO NO 50633

FYI,

Today I observed TEI Jon McCarra doing a leak check on the ABT burner pitot manifold silver brazing welds.

Each manifold has 11 joints on the total pressure (TP) and 11 joints on the static pressure (SP).

2 on each side of the 3 pitot couplings, 4 on each side of the cross and a pipe to tubing joint.

I have enclosed representative photos of the leak check soap bubbles showing leaks, some leaks were small, a couple were very large.

Here's a list of the leaks we found on the 9 burners staged on the rear of the boiler.

7th floor

CW6 - SP, 1 leak on coupling to pitot

CW3 - TP = 3 leaks, pipe to tubing, top leg of cross, 11:00 pitot coupling

CW14 2 leaks, SP = bottom 6:00 coupling, TP = bottom 6:00 coupling

6th floor

CW8 - 1 leak, TP - top of cross

CW4 - 2 leaks, SP tube to pipe, and 11:00 coupling,

CW5 - 8 leaks, SP - 3 sides of cross, top 11:00 coupling, TP = 2 sides of cross, bottom 6:00 coupling

5th floor

IP7_026302

All three burners had no leaks, they appeared to be better welded.

As a percent of burners, 66% of the burners had leaks in the manifold.
As a percent of joints from the total of $9 \times 22 = 198$ joints, $17/198 = 8.5\%$ of joints.

What weld repair remedy would you suggest?

We will check the burners on the boiler front tomorrow.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/4/2004 8:38:38 AM >>>

Jerry,

The tube joints are joined by silver brazing since the soldering process has too low of a temperature rating for our purpose. Andy Chew has it backwards in his response to you. Silver soldering is rated for a working temperature in the 400 to 500°F range. Silver brazing is typically rated upwards of 1100°F working temperature range. Concerning the appearance of the brazed joints, PCW did not clean all the joints in which case you see some of the flux material used in the brazing process. PCW has assured us that the joints are good and will not leak.

Let me know if you have other questions.

Regards,

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Tuesday, February 03, 2004 8:17 PM

To: Howard Hamilton; James Nelson; Phil Hailes

Cc: sal@advancedburner.com

Subject: Fwd: RE: ABT burner pitot photos - AMC WO NO 50633

FYI,

Here's Air Monitor's response to the photos of the IBAM manifold welding.

Hopefully, they did use silver solder, not brazing.

Sal, please advise.

Jerry

Jerry Finlinson, Engineer

IP7_026303

Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 2/3/2004 4:34:23 PM >>>
Jerry,

Air Monitor agreed to ABT's suggestion of using a sealing method other than Heliarc welding. Originally they mentioned brazing but we insisted on silver solder because the temperature rating of the silver solder joint is much higher than that of brazing. You should ask ABT about this but it appears they did not clean the solder joints. They may be good joints and just not look very pretty. You want to make sure they are pressure tested before going into service. When we modified the probes we only added additional Total pressure sensor holes to the production manifolds. Additional Static pressure sensor holes were determined to be not necessary as they did not improve the performance accuracy of the device. We will be providing an as built drawing which will include the pressure sensor details. Again, I am expecting to have the final burner test report anytime now and I will forward to you then.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
Tel.: 707-521-1709
Fax: 707-526-2825
Email: achew@airmonitor.com

This message scanned for viruses by CoreComm

IP7_026304

From: Dean Wood
To: Duwel, Joe; Finlinson, Jerry; Hailes, Phil; Knapp, Jim; Lovell, Will...
Date: 6/28/2005 2:13 PM
Subject: U2 F3 Burner-fore Meeting Minutes_June 2005
Attachments: U2 F3 Burner-fore Meeting Minutes_June 2005.wpd

I wanted to give you all a chance to review these minutes and comment before I send them out officially.

Please let me know if you have additions or changes.

Thanks,

Dean

IP7_026305

Meeting Minutes
Unit 2, F3 Burner-fire
June 28, 2005

A meeting was held on June 28, 2005 to gather information on the issues surrounding the burner fire that occurred recently in Unit 2 F3 burner. Those in attendance were:

- | | |
|-------------------|---------------|
| ● Joe Duwel | ● Will Lovell |
| ● Jerry Finlinson | ● Bill Morgan |
| ● Phil Hailes | ● Dave Spence |
| ● Jim Knapp | ● Dean Wood |

Joe stated that Operations has noted the build-up of large clinkers in the burners from time-to-time. He also pointed out significant temperature spikes in several (4 to 8) of the unit 2 burners recently. Operations feels that these indications are real which points to the possibility of fires in the fuel injector (coal pipe) of these new burners. Burner temperature indications are inconsistent across the burner rows. That is, some burner tip temperatures are reading as much as 200 to 300 degrees F below others in the same row. This points to instrumentation problems. Joe reminded the group of the lack of alarms for high temperatures and encouraged us to find a permanent solution to that issue so Operations has the information to snuff fires in a timely manner. Joe suggested that Operations should inspect burner lines for build up following pulverizer trips.

Dave Spence located a record of where the burner line restrictors were set on Unit 2 and reported that these settings have NOT changed since initial balancing was done in 2004. Dave wants to validate the temperature spikes that Joe mentioned by taking temperature readings on the side of the X-vane spool piece on burners that are experiencing spikes.

Bill pointed out that the temperature switches designed to send a high-temperature alarm to the Sequence of Events Recorder (SOE) have mostly failed (burned up) so these instruments have been jumpered out. There is no other audible alarm but two Thermocouples (TC's) indicate the temperature of the coal pipe and the burner tip. These indications show on the ABB Data Acquisition System (DAS) screens in the control room. Bill asked for verification of where the High and High-high alarm set points should be set in the DAS.

Jerry explained that the sharp bends in the thermowells for the coal-pipe and burner-tip TC's preclude replacement of the TC's with heavier original TC's. Instead a thinner, more flexible TC has been used. He feels this may be the cause for some of the inconsistent readings that Joe mentioned. Jerry suggested moving the coal-pipe TC outside the windbox onto the side of the X-vane spool where it can be maintained better. He also wants to retrofit the burner-tip thermowell with one that employs gradual bends. ABT has recommended installing a third TC.

Phil is leaning towards coal accumulation as the cause of the fire in light of Joe's observations but pointed out that excessive erosion could have been a factor. He pointed to the

large slag deposit in the fuel-injector. He would like maintenance to remove the elbow/X-vane assembly for inspection. He also wants the burner-line restrictor on F3 removed for inspection. Phil asked to be present when these components are removed. Phil suggested that repair of the fuel-injector could be done on-line. All agreed that ABT should be consulted to get their input on that idea. DG&T is rumored to have replaced a fuel-injector on line.

Action Items resulting from this meeting are as follows:

- Joe Duwel will work with Operations to initiate burner inspections following mill trips.
- Bill Morgan will take the lead on getting interim alarming of high burner temperatures.
- Dave Spence will try to validate the high-temperature spikes witnessed on some burners with IR readings at the X-vane spool.
- Phil Hailes will contact ABT to verify the High and High-high alarm settings; their suggestions or position on replacement of the fuel injector on-line;
- Phil will speak with DG&T personnel tomorrow when he visits their plant to see if they have had similar issues or if they have experience with replacing the fuel injectors on-line.
- Jerry Finlinson will order new TC's to replace suspect instruments. Jim Knapp assist.
- Jerry will take the lead on retro-fitting the thermowells, installing a third TC, or the option of moving the burner-line TC outside the windbox.
- Will Lovell will have Maintenance pull the elbow/X-vane assembly and the burner-line restrictor for inspection.

From: "Ed Maile" <emaile@tteconline.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 6/29/2005 8:10 AM
Subject: Re: Burner Thermocouple quote

Good Morning Jerry,
5pcs T-TEC # 10-4881REV.2-1 \$99.70 net/ea
15pcs T-TEC # 10-4881REV.2-2 \$92.55 net/ea
Shipment: 2 - 3 weeks aro.
Please ref our quotation #J0629EM2
Thank You
Have a good day,
Ed

P.S. Will quote your 48 pcs type E T/C,s shortly

----- Original Message -----

From: "Jerry Finlinson" <Jerry-F@ipsc.com>
To: <emaile@tteconline.com>
Cc: "Jim Knapp" <JIM-KNAPP@ipsc.com>
Sent: Tuesday, June 28, 2005 4:29 PM
Subject: Re: Burner Thermocouple quote

> Thanks Ed,
> As we discussed I have dwg 10-4481 Rev 2. of the Type E Simplex
> Thermocouple.
> We'd like 15 of the longer ones and 5 of the shorter ones. Please
> quote.
> We'd like a delivery within 2-3 weeks if possible, as we've had some
> failures and have no spares.
>
> We also need a quote for 48 Type E thermocouples that could be welded
> onto a 20 inch steel pipe.
> Maybe some type of weld pad with compression fitting. The thermocouple
> could be 6-8 inches long
> and have a 4 ft lead to a nearby junction box.
>
> Thanks, Jerry
>
> Jerry Finlinson, Engineer
> Intermountain Power Service Corp
> 850 West Brush Wellman Rd
> Delta, UT 84624
> 435-864-6466 fax 0776/6670
> jerry-f@ipsc.com
>
> >>> "Ed Maile" <emaile@tteconline.com> 6/28/2005 1:40:09 PM >>>
> Good Afternoon Jerry,
> We cannot find your old order,
> can you please call us at 215-529-9394
> Thank you
> Have a good night
> Ed
>

IP7_026308

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Joel Vatsky" <joel@advancedburner.com>, "Phil Hailes" <Phil-H@ipsc.com>...
Date: 6/30/2005 12:24 PM
Subject: RE: unit 2 ABT burner fire photos

Jerry,

Based on the pictures the fire seems to have started either in the coal pipe or at the burner inlet. Where the coal pipe penetrates the floor grating, in vicinity of the burner shutoff valve, seems to have been subject to overheating in addition to the fire damage to the back of the fuel injector.

At this point the items we would recommend investigating is the primary airflow and burner shutoff damper position history prior to and around the time either the tip or body thermocouple temperatures rose above the normal operating temperatures. We know from our testing experience in Spring 2004 that the plant experienced problems with burner shutoff valves randomly going closed while the burner was in service (this is potential for causing fire in coal pipe or fuel injector). Also see if any abnormal PA flow of shutoff damper conditions could be correlated with temperature excursions on other burners (Dean Wood mentioned in phone discussion that there are some other burners that experience repeatable high temperatures excursions @ once or twice per day).

Also at first available outage, the plant should remove an elbow on one, or several, burners that experience periodic temperature excursions to inspect ABT's elbow fuel distributor, fuel injector barrel and burner shutoff valve for signs of overheating. I do not know how your temperature alarm is configured however it would be best if triggered by a rate of temperature change, rather than a specific temperature limit. If a rate of change logic is not utilized for the alarm, then we would recommend setting the alarm point @ 100 degree F above the temperature measured during normal operation.

We are working on providing a price for complete burner replacement. If the secondary air register assembly is OK you may only need to replace the fuel injector assembly, although you most likely need an outage to pull the fuel injector and inspect the burner to determine this.

You also mentioned the thermowell and making the thermocouple reading more reliable. I am not sure what this means, since I am not aware that there has been a temperature measurement reliability issue on either the fuel injector tip or body readings. Please provide more detail on this.

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, June 27, 2005 2:03 PM
To: joel@advancedburner.com; sal@advancedburner.com;
tarkel@advancedburner.com
Cc: nelsonj@compassminerals.com; Dean Wood; Howard Hamilton; Jon Christensen; Phil Hailes
Subject: unit 2 ABT burner fire photos

Joel and Sal,

This past weekend, 25 June 2005, we had a burner fire one of the new unit 2 ABT burners F3.

IP7_026309

It happened during the time that we were starting up unit 1,
so the unit 2 operator was over at the unit 1 control board and didn't
notice
the alarm from the thermocouples that we had installed in the burner.
Both the coal pipe
and nozzle tip thermocouple went above 1600F.

As you can see from the attached photos, damage was extensive. The
inner coal pipe has melted out the bottom
and there is a slag pile inside the burner. The nozzle appears OK.
The burner elbow heated up cherry red
and flaked off the paint. The thermocouples and temperature switch
were melted. A hole is
burned through the back of the burner, so we can look right through the
windbox wall into
the back of the burner.

We'd like you to work with us to determine the cause of the burner
fire and any possible
preventive measures. Also what will be required to get it repaired.
Do we need to replace
the burner completely, or could it be repaired in position.

Let's also address the issue with the thermowell and how to make the
thermocouple readings more
reliable.

I recall you saying that there had never been a burner fire in this
burner design.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

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IP7_026310

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: <joel@advancedburner.com>, <tarkel@advancedburner.com>, "Dean Wood" <Dea...>
Date: 7/6/2005 8:36 AM
Subject: RE: Unit 2 ABT burner fire Elbow photos
Attachments: 03008-400-A00-D16-R01.pdf; 03008-400-A00-D18-R01.pdf; 03008-400-A00-D19.pdf

Jerry,

Thank you for photos which are very informative. Concerning the thermocouples, I'm not sure that increasing the alarm point to 1500 F will help since this gives the operators less time to react to a possible fire in the burner. On other units the burner nozzle temperature runs between 800-900 F while the burner is in operation, and 1100-1200 F when it is out of service.

My 6/30/05 response had mentioned some areas to investigate to prevent causes of burner/coal pipe fires. Another area to investigate, that I didn't mention in my earlier response, is the Riley coal pipe balancing dampers that we understand are installed in the coal pipes. We do not have any data from the plant concerning coal pipe balance however these dampers could be wearing rapidly causing increased coal pipe imbalances. Coal pipes could be heavily loaded with coal and at the same time have low airflow, which we have seen on other units where coal flow does not follow the airflow, could experience layout leading to pluggage and/or fires.

Concerning thermocouple routing, I do not believe it would be possible to stay within the fuel injector envelop without having some bends. Maintaining the same routing, however with larger diameter pipe and reduced bend radii, will make it easier to insert the thermocouples (possible even to allow use of the original thermocouples, which should still be on-site). Attached for your information are the details for the existing fuel injector thermowells.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, June 30, 2005 6:08 PM
To: sal@advancedburner.com
Cc: joel@advancedburner.com; tarkel@advancedburner.com; nelsonj@compassminerals.com; Bill Morgan; Dean Wood; Howard Hamilton; Jon Christensen; Ken Nielson; Phil Hailes
Subject: Unit 2 ABT burner fire Elbow photos

Sal,

Thanks for the feedback. Today our mechanics removed the burner elbow from the F3 burner. I have included some photos of the elbow. It shows one side of the fuel distributor to be melted off. We'll pull another one of an see if it also shows some damage.

We had set our burner thermocouples to alarm at 1350 on the nozzle tip. Four of them are going high for a few minutes several times per day, so we are going to raise them to 1500F. We are trying to determine if it is some

IP7_026311

electrical noise or
a real temperature increase. So far it seems to be real. We'll let
you know if we find
anything definitive.

It appears that the secondary air register assembly inside the burner
is also melted on the
bottom, so we'll likely require an entire new burner. Phil and Dean
will work out the
details with you.

Thermowell issues. At the very beginning, you designed two thermowells
into the burner
at our request. It was a 3/8 inch tube with a 1/4 inch thermocouple.
However,
your manufacturing made the thermowells with two 45 degree bends in
each one
as per the drawing. It was impossible to insert the 1/4 inch
thermocouples around those
bends. So we worked with Tarkel to order 1/16 inch diameter
thermocouples.
They are still difficult to insert, partly because they bend easily and
are hard to push.
So we are proposing to install a new straighter thermowell in to the
nozzle tip.
We need your assistance to determine the best routing for the
thermowell, so that
we can insert it without any bends.

On the coal pipe body readings some of our thermocouples have read low
by 100 to 200 degF.
We are theorizing that maybe the thermocouple is not bottomed in the
thermowell, but are
not sure.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Sal Ferrara" <sal@advancedburner.com> 6/30/2005 12:18:54 PM >>>
Jerry,
Based on the pictures the fire seems to have started either in the coal
pipe
or at the burner inlet. Where the coal pipe penetrates the floor
grating, in
vicinity of the burner shutoff valve, seems to have been subject to

overheating in addition to the fire damage to the back of the fuel injector.

At this point the items we would recommend investigating is the primary airflow and burner shutoff damper position history prior to and around the time either the tip or body thermocouple temperatures rose above the normal operating temperatures. We know from our testing experience in Spring 2004 that the plant experienced problems with burner shutoff valves randomly going closed while the burner was in service (this is potential for causing fire in coal pipe or fuel injector). Also see if any abnormal PA flow of shutoff damper conditions could be correlated with temperature excursions on other burners (Dean Wood mentioned in phone discussion that there are some other burners that experience repeatable high temperatures excursions @ once or twice per day).

Also at first available outage, the plant should remove an elbow on one, or several, burners that experience periodic temperature excursions to inspect ABT's elbow fuel distributor, fuel injector barrel and burner shutoff valve for signs of overheating. I do not know how your temperature alarm is configured however it would be best if triggered by a rate of temperature change, rather than a specific temperature limit. If a rate of change logic is not utilized for the alarm, then we would recommend setting the alarm point @ 100 degree F above the temperature measured during normal operation.

We are working on providing a price for complete burner replacement. If the secondary air register assembly is OK you may only need to replace the fuel injector assembly, although you most likely need an outage to pull the fuel injector and inspect the burner to determine this.

You also mentioned the thermowell and making the thermocouple reading more reliable. I am not sure what this means, since I am not aware that there has been a temperature measurement reliability issue on either the fuel injector tip or body readings. Please provide more detail on this.

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Monday, June 27, 2005 2:03 PM

To: joel@advancedburner.com; sal@advancedburner.com;
tarkel@advancedburner.com

Cc: nelsonj@compassminerals.com; Dean Wood; Howard Hamilton; Jon Christensen; Phil Hailes

Subject: unit 2 ABT burner fire photos

Joel and Sal,

This past weekend, 25 June 2005, we had a burner fire one of the new unit 2 ABT burners F3.

It happened during the time that we were starting up unit 1, so the unit 2 operator was over at the unit 1 control board and didn't notice

the alarm from the thermocouples that we had installed in the burner.

Both the coal pipe

and nozzle tip thermocouple went above 1600F.

As you can see from the attached photos, damage was extensive. The inner coal pipe has melted out the bottom

and there is a slag pile inside the burner. The nozzle appears OK.

The burner elbow heated up cherry red

and flaked off the paint. The thermocouples and temperature switch were melted. A hole is

burned through the back of the burner, so we can look right through the

windbox wall into

the back of the burner.

We'd like you to work with us to determine the cause of the burner fire and any possible

preventive measures. Also what will be required to get it repaired.

Do we need to replace

the burner completely, or could it be repaired in position.

Let's also address the issue with the thermowell and how to make the thermocouple readings more reliable.

I recall you saying that there had never been a burner fire in this burner design.

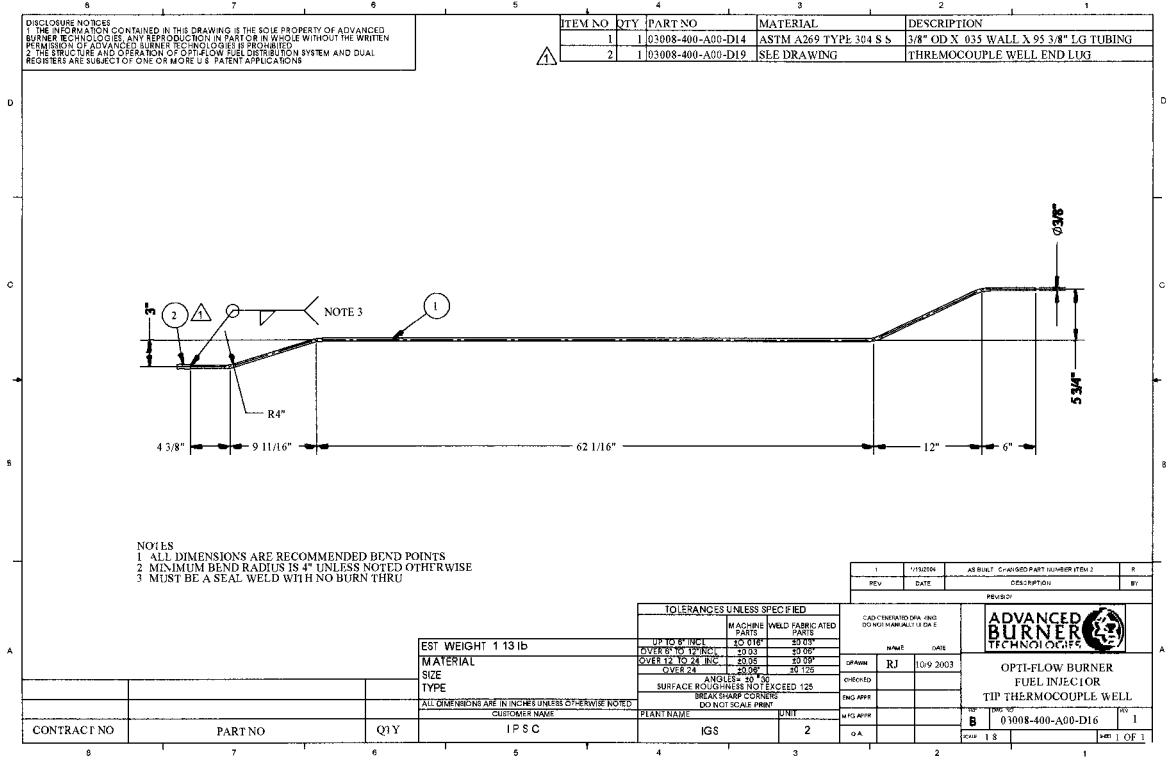
Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

IP7_026314

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From: Jerry Finlinson
To: Jon's Group
Date: 7/21/2005 4:00 PM
Subject: Dean's U2 F3 burner fire report.
Attachments: U2 F3 Burner Fire Report.wpd

Here is the report that Dean wrote to explain U2 F3 burner fire incident to George. It is not an official incident report.
Later, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
jerry-f@ipsc.com

* Every day above ground is a good day.

IP7_026317

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Alan Paschedag" <alan@advancedburner.com>, "Phil Hailes" <Phil-H@ipsc.c...>
Date: 7/27/2005 2:41 PM
Subject: FW: IPSC U2 Burner IBAM silver brazing failure
Attachments: Braze-Solder List.pdf

Jerry,

After reviewing the photos and looking further into our fabricator's (PCW) silver brazing application, I do not see any reason that the silver brazed joints would be failing over time due to the 700 degree secondary air temperature. This is well below the temperature rating of the brazing material used (PCW used J.W. Harris "Safety-Silv 50N" applied with "Stay-Silv Flux-black") which has a Solidus-Liquidus range of 1220-1305 deg F. Reference attached "Braze/Solder Product List" which indicates that this is the correct application for stainless and temperatures.

The only other reasons I can think of that could cause the brazed joints to fail is either damage by handling during the installation of the burner in the windbox, or due to secondary air flyash chemistry corroding joints. Since the weld repaired joints seem to be holding up, and not knowing the flyash chemistry at this point, I would recommend repairing leaks in the future with Heliarc method IPSC used to make original repairs.

Note that we will also use Heliarc to make the IBAM tube/fitting welds on the replacement burner for IPSC PO No. 06-48595. Also if you could let me know the chemistry of the ash in secondary air, I would be happy to follow-up with J.W. Harris to see if this could possibly cause corrosion of the brazed joints.

Regards,
Sal

-----Original Message-----

From: Sal Ferrara [mailto:sal@advancedburner.com]
Sent: Wednesday, June 01, 2005 11:15 AM
To: Jerry Finlinson
Subject: RE: IPSC U2 Burner IBAM silver brazing failure

Jerry,

I don't mean to keep you hanging. I am looking into this and will respond back with our recommendation as soon as possible.

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, May 26, 2005 10:18 AM
To: sal@advancedburner.com; tarkel@advancedburner.com; mmaragos@airmonitor.com; khpquip@earthlink.net
Cc: Aaron Nissen; Bill Morgan; Garry Christensen; Howard Scott; Jerry Finlinson; Jim Knapp; John Fritzges; Jon Christensen; Ken Nielson; Nathan Crop; Pam Bahr
Subject: IPSC U2 Burner IBAM silver brazing failure

FYI,

During our Feb05 unit 2 outage I went in to inspect the D1 burner

IP7_026318

which had a bad IBAM signal. At that time we found 2 broken manifold pipes. They were weld repaired, but the signal was still bad. So this week during our tube leak outage, I went in to inspect and found those weld repairs still good, but there were 6 other leaky fittings in the stainless steel couplings and T's. This was originally silver brazed by Advanced Burner at their manufacturing shop. We found many leaks upon delivery and they were rebrazed on site.

Now we find that apparently that brazing material is not holding up to the 700 F temp in the secondary air windboxes and new leaks are developing. PCW's assurances that the joints were all good and will not leak has proven to be incorrect. So we need to remedy the situation. We'll need to plan a major project to go in on the next major outage and do a proper weld on all those fittings. What type of weld would you advise? Heliarc?

Do you provide warranty coverage for this type of failure?

Please advise.

Below is some emails that we exchanged on the original problem in Feb 2004. At that time we were advised by ABT that silver brazing would be able to withstand temps up to 1100 F. Notice in the enclosed photos that the brazing appears to be flaking off on the outside. Also when our guys do a weld on one side of the fitting then the brazing melts out on the otherside, so they must do it all the way around.

Jerry

Jerry,

I am sure you will let us know what ABT proposes to remedy the tubing joint leaks.

Thanks.

Andy

-----Original Message-----

IP7_026319

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, February 05, 2004 5:46 PM
To: sal@advancedburner.com; Bill Morgan; Howard Hamilton; James Nelson;
Ken Nielson; Phil Hailes
Cc: Andy Chew; Matt Maragos; khpquip@earthlink.net
Subject: ABT burner pitot manifold leak photos - AMC WO NO 50633

FYI,

Today I observed TEI Jon McCarra doing a leak check on the ABT burner pitot manifold silver brazing welds.

Each manifold has 11 joints on the total pressure (TP) and 11 joints on the static pressure (SP).

2 on each side of the 3 pitot couplings, 4 on each side of the cross and a pipe to tubing joint.

I have enclosed representative photos of the leak check soap bubbles showing leaks, some leaks were small, a couple were very large.

Here's a list of the leaks we found on the 9 burners staged on the rear of the boiler.

7th floor

CW6 - SP, 1 leak on coupling to pitot

CW3 - TP = 3 leaks, pipe to tubing, top leg of cross, 11:00 pitot coupling

CW14 2 leaks, SP = bottom 6:00 coupling, TP = bottom 6:00 coupling

6th floor

CW8 - 1 leak, TP - top of cross

CW4 - 2 leaks, SP tube to pipe, and 11:00 coupling,

CW5 - 8 leaks, SP - 3 sides of cross, top 11:00 coupling, TP = 2 sides of cross, bottom 6:00 coupling

5th floor

All three burners had no leaks, they appeared to be better welded.

As a percent of burners, 66% of the burners had leaks in the manifold.

As a percent of joints from the total of $9 \times 22 = 198$ joints, $17/198 = 8.5\%$ of joints.

What weld repair remedy would you suggest?

We will check the burners on the boiler front tomorrow.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

Jerry Finlinson, Engineer
Intermountain Power Service Corp

IP7_026320

850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/4/2004 8:38:38 AM >>>

Jerry,

The tube joints are joined by silver brazing since the soldering process has too low of a temperature rating for our purpose. Andy Chew has it backwards in his response to you. Silver soldering is rated for a working temperature in the 400 to 500°F range. Silver brazing is typically rated upwards of 1100°F working temperature range.

Concerning the appearance of the brazed joints, PCW did not clean all the joints in which case you see some of the flux material used in the brazing process. PCW has assured us that the joints are good and will not leak.

Let me know if you have other questions.

Regards,

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Tuesday, February 03, 2004 8:17 PM

To: Howard Hamilton; James Nelson; Phil Hailes

Cc: sal@advancedburner.com

Subject: Fwd: RE: ABT burner pitot photos - AMC WO NO 50633

FYI,

Here's Air Monitor's response to the photos of the IBAM manifold welding.

Hopefully, they did use silver solder, not brazing.

Sal, please advise.

Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 2/3/2004 4:34:23 PM >>>

Jerry,

Air Monitor agreed to ABT's suggestion of using a sealing method other than

Heliarc welding. Originally they mentioned brazing but we insisted on silver solder because the temperature rating of the silver solder joint is

much higher than that of brazing. You should ask ABT about this but it appears they did not clean the solder joints. They may be good joints and

just not look very pretty. You want to make sure they are pressure tested

before going into service. When we modified the probes we only added additional Total pressure sensor holes to the production manifolds.

Additional Static pressure sensor holes were determined to be not

IP7_026321

necessary
as they did not improve the performance accuracy of the device. We
will be
providing an as built drawing which will include the pressure sensor
details. Again, I am expecting to have the final burner test report
anytime
now and I will forward to you then.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
Tel.: 707-521-1709
Fax: 707-526-2825
Email: achew@airmonitor.com

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IP7_026322



Other ways to join metals

FOR BRAZING & SOLDERING
J.W. HARRIS PRODUCTS

- ▶ Photo-Copper Brazing Alloys
- ▶ Silicon Brazing Alloys
- ▶ High Silver Brazing Alloys
- ▶ Brazing Rings
- ▶ Soldering Alloys
- ▶ Brazing & Soldering Fluxes

- ▶ Braze/Solder Product List
- ▶ Braze/Solder Selection Chart
- ▶ Braze/Solder Procedures
- ▶ Frequently Asked Questions

FOR BRAZING & SOLDERING
AUTOMOBILE PRODUCTS

- ▶ Brazing Rings
- ▶ Ordering Information

FOR WELDING
J.W. HARRIS PRODUCTS

- ▶ Aluminum Welding Alloys
- ▶ Carbon Steel Welding Alloys
- ▶ Copper-Base Welding Alloys
- ▶ Corad Welding Alloys
- ▶ Maint. & Specialty Alloys
- ▶ Perfect Circle Welding Wire
- ▶ Stainless Steel Alloys
- ▶ Welding Fluxes

- ▶ Specification/MSDS Sheets
- ▶ Harris Welding Technical Guide
- ▶ Welding Procedures
- ▶ Frequently Asked Questions

▶ PLEASE READ WARNING !

J.W. Harris Brazing References:

- Part 1 - Product Specifications
- Part 2 - Chemical Composition
- Part 3 - Product Characteristics & Applications

Braze/Solder Product List

Filler Metal Selection Chart - Part 1 of 3					
J.W. Harris	QQ-B-654A	AMS	AWS A5.8	Handy & Harman	Engelhard
Harris 0	-	-	BCuP-2	Fos-Flo 7	Silvaloy 0
Harris OLP	-	-	-	-	-
Harris OHP	-	-	BCuP-2	-	-
Stay-Silv® 2	-	-	BCuP-6	Sil-Fos 2	Silvaloy 2
Stay-Silv 2LP	-	-	-	Sil-Fos 2M	-
Stay-Silv 2HP	-	-	-	-	-
Stay-Silv 5	-	-	BCuP-3	Sil-Fos 5	Silvaloy 5
Stay-Silv 5LP	-	-	-	-	-
Stay-Silv 5HP	-	-	-	-	Silvaloy 5F
Stay-Silv 6	-	-	-	-	-
Stay-Silv 6LP	-	-	-	-	-
Stay-Silv 6HP	-	-	BCuP-4	Sil-Fos 6	Silvaloy 6F
Dynaflow®	-	-	-	-	-
Stay-Silv 15	BCuP-5	-	BCuP-5	Sil-Fos	Silvaloy 15
Safety-Silv 25	-	-	BAG-37	Braze 255	Silvaloy A25T
Safety-Silv 30	BAG-20	-	BAG-20	Braze 300	Silvaloy A-30

<http://www.jwharris.com/jwref/list/>

NAVIGATION KEY

- > J.W. Braze/Solder Product Info
- > J.W. Braze/Solder References
- > Welco Welding Product Info
- > Product References

Safety-Silv 35	-	-	BAG-35	-	Silvaloy A-35
Safety-Silv 38T	-	-	BAG-34	-	-
Safety-Silv 40	-	-	-	Braze 401	Silvaloy A-40L
Safety-Silv 40N12	BAG-4	-	BAG-4	Braze 403	Silvaloy A-40N2
Safety-Silv 40T	-	-	BAG-28	Braze 402	Silvaloy A-40T
Safety-Silv 45	BAG-5	-	BAG-5	Braze 450	Silvaloy A-45
Safety-Silv 45T	-	-	BAG-36	-	-
Safety-Silv 50	-	-	BAG-6	Braze 501	Silvaloy A-50
Safety-Silv 50N	-	4788	BAG-24	Braze 505	Silvaloy A-50N
Safety-Silv 54	-	4772	BAG-13	Braze 541	Silvaloy A-54N
Safety-Silv 56	BAG-7	4763	BAG-7	Braze 560	Silvaloy A-56T
Safety-Silv 72	-	-	BAG-8	Braze 720	Silvaloy B-72
Stay-Brite®	QQ-S-571E (Class SN96)	-	-	-	-
Stay-Brite 8	-	-	-	-	-
Bridgit®	-	-	-	-	-
Alsolder 500	-	-	-	-	-
Al-braze 1070	-	-	-	-	-
Ag Clad 40N12*	-	-	BAG-4	Trimet 201	Silvaloy Plymetal 2501
	QQ-B-654A	AMS	AWS A5.8	Handy B Harman	Engelhard

Filler Metal Selection Chart - Part 2 of 3						
J.W. Harris	Ag	Cu	Zn	Ni	Sn	Other
Harris 0	-	92.9	-	-	-	7.1P
Harris OLP	-	93.2	-	-	-	6.8P
Harris OHP	-	92.6	-	-	-	7.4P
Stay-Silv® 2	2	91.0	-	-	-	7.0P

<http://www.jwharris.com/jwref/list/>

Stay-Silv 2LP	2	91.4	-	-	-	6.6P
Stay-Silv 2HP	2	90.6	-	-	-	7.4P
Stay-Silv 5	5	89.0	-	-	-	6.0P
Stay-Silv 5LP	5	89.3	-	-	-	5.7P
Stay-Silv 5HP	5	88.5	-	-	-	6.5P
Stay-Silv 6	6	87.5	-	-	-	6.5P
Stay-Silv 6LP	6	87.8	-	-	-	6.2P
Stay-Silv 6HP	6	86.8	-	-	-	7.2P
Dynaflow®	6	87.9	-	-	-	6.1P
Stay-Silv 15	15	80.0	-	-	-	5.0P
Safety-Silv 25	25	43	30	-	2	-
Safety-Silv 30	30	38	32	-	-	-
Safety-Silv 35	35	32	33	-	-	-
Safety-Silv 38T	38	32	28	-	2	-
Safety-Silv 40	40	30.5	29.5	-	-	-
Safety-Silv 40Ni2	40	30	28	2	-	-
Safety-Silv 40T	40	30	28	-	2	-
Safety-Silv 45	45	30	25	-	-	-
Safety-Silv 45T	45	27	25	-	3	-
Safety-Silv 50	50	34	16	-	-	-
Safety-Silv 50N	50	20	28	2	-	-
Safety-Silv 54	54	40	5	1	-	-
Safety-Silv 56	56	22	17	-	5	-
Safety-Silv 72	72	28	-	-	-	-
Stay-Brite®	4	-	-	-	96	-
Stay-Brite 8	6	-	-	-	94	-
Bridgit®	-	-	-	-	-	-

<http://www.jwharris.com/jwref/list/>

Al-solder 500	-	-	15	-	85	-
Al-braze 1070	-	Aluminum/Silicon			-	-
AG Clad 40Ni2*	See Safety-Silv 40Ni2 composition					-
	Ag	Cu	Zn	Ni	Sn	Other


Filler Metal Selection Chart - Part 3 of 3					
J.W. Harris	Solidus °F - °C	Liquidus °F - °C	Fluidity Rating**	Typical Application Data	
Harris 0	1310 - 710	1475 - 802	5	For copper or brass. Requires good fit-up, .002/.005" clearance.	
Harris OLP	1310 - 710	1510 - 821	4	For copper. Flow is more sluggish, fit-up should provide .003-.005" clearance.	
Harris OHP	1310 - 710	1445 - 785	6	For copper or brass. Fluid alloy, requires good fit-up, .002-.004" clearance.	
Stay-Silv® 2	1190 - 643	1450 - 788	4	Broadens melting range of 0. For copper or brass. Clearance range .002-.005"	
Stay-Silv 2LP	1190 - 643	1500 - 816	3	Sluggish flow, used for copper joints with wider clearance. .003-.006"	
Stay-Silv 2HP	1190 - 643	1405 - 763	5	For copper or brass. More fluid clearance .002-.005"	
Stay-Silv 5	1190 - 643	1500 - 816	3	For copper or brass. Used to bridge gaps where close fit-up can't be maintained.	
Stay-Silv 5LP	1190 - 643	1535 - 835	2	For copper. Used where fit-up can't be controlled, clearance of .003-.005".	
Stay-Silv 5HP	1190 - 643	1445 - 785	4	For copper or brass. Slightly more fluid, use with clearance of .003-.005".	
Stay-Silv 6	1190 - 643	1425 - 774	5	For copper or brass. Medium range alloy for applications with clearances of .002-.005".	
Stay-Silv 6LP	1190 - 643	1455 - 791	4	For copper or brass. For bridging gaps where more ductile filler metal is required.	
Stay-Silv 6HP	1190 - 643	1335 - 724	7	For copper or brass. Fluid alloy for controlled clearance .001-.004". Good for automated brazing.	
Dynaflow®	1190 - 643	1465 - 796	3	Premium alloy for copper or brass. Excellent strength and ductility, use as replacement for 15	

<http://www.jwharris.com/jwref/list/>

Stay-Silv 15	1190 - 643	1480 - 804	3	For copper or brass. Useful for wide clearance .002-.006". Good ductility.
Safety-Silv 25	1265 - 685	1430 - 777	5	For steel and copper alloys. Moderate ductility. For dissimilar metals joints should be in compression on cooling.
Safety-Silv 30	1250 - 677	1410 - 766	6	Use with ferrous and nonferrous base metals. Flow suitable for bridging gaps.
Safety-Silv 35	1250 - 677	1350 - 732	5	Ferrous and nonferrous base metals. Moderate temperature and good ductility.
Safety-Silv 38T	1220 - 660	1325 - 718	7	Low temperature, free-flowing alloy with exceptional fillet-forming quality. For ferrous and nonferrous metals.
Safety-Silv 40	1250 - 677	1350 - 732	5	For steel, nickel, copper alloys. Suitable for wider clearance yet provides good ductility.
Safety-Silv 40Ni2	1220 - 660	1435 - 779	4.5	For stainless steel, nickel alloys for corrosion resistance and strength. Good choice for tungsten carbides.
Safety-Silv 40T	1220 - 660	1310 - 710	6.5	Good flow properties. Suitable for ferrous and nonferrous base metals.
Safety-Silv 45	1225 - 663	1370 - 743	6.5	General purpose filler for steel alloys, copper alloys. Melting range useful for wide clearances.
Safety-Silv 45T	1195 - 646	1265 - 685	7	Good flow properties with lower brazing temperature. Designed for use on copper, brass and steel. NSF 51
Safety-Silv 50	1270 - 688	1425 - 774	5.5	Often used to braze galvanized steel but suitable for bridging gaps in other ferrous and nonferrous metals.
Safety-Silv 50N	1220 - 660	1305 - 707	7	For stainless steel applications, to prevent crevice corrosion.
Safety-Silv 54	1325 - 718	1575 - 857	4	For higher temperature service. Frequently used to braze aircraft parts.
Safety-Silv 56	1145 - 618	1205 - 652	8	For ferrous and nonferrous alloys. Often used to braze stainless steel for foodservice. NSF 51
Safety-Silv 72	1435 - 779	1435 - 779	10	For atmosphere or vacuum brazing of copper and steel alloys.
Stay-Brite®	430 - 221	430 - 221	10	Low temperature solder for all metals except aluminum. Used in refrigeration joints. Certified to NSF 51

<http://www.jwharris.com/jwref/list/>

IP7_026327



FOR BRAZING & SOLDERING
J.W. HARRIS PRODUCTS

- > Phos/Copper Brazing Alloys
- > Silicon Brazing Alloys
- > High Silver Brazing Alloys
- > Brazing Ropes
- > Soldering Alloys
- > Brazing & Soldering Fluxes

> Braze/Solder Product List

> Braze/Solder Selection Chart

> Braze/Solder Procedures

> Frequently Asked Questions

FOR BRAZING & SOLDERING
ALUMINUM PRODUCTS

- > Brazing Ropes
- > Ordering Information

FOR WELDING
J.W. HARRIS PRODUCTS

- > Aluminum Welding Alloys
- > Carbon Steel Welding Alloys
- > Copper-Bronze Welding Alloys
- > Cored Welding Alloys
- > Inert. & Specialty Alloys
- > Perfect Circle Welding Wire
- > Stainless Steel Alloys
- > Welding Fluxes

> Specification/MSDS Sheets

> Harris Wilson Technical Guide

> Welding Procedures

> Frequently Asked Questions

> PLEASE READ WARNING

J.W. Harris Brazing Products:

Brazing & Soldering Fluxes

Brazing Fluxes/Leak Detector

- Stay-Silv® Brazing Flux (white)
- Stay-Silv® Brazing Flux (black) ←
- Leak Detector

Soldering Fluxes

- Bridgit Water-Soluble Paste Flux
- Stay-Clean® Soldering Flux
- Stay-Clean Paste Soldering Flux
- Stay-Clean Aluminum Flux
- Al-Braze 1070 Flux

Stay-Silv® Brazing Flux (white)
For use with silver brazing alloys on all metals other than aluminum, magnesium or titanium. Effective to 1600°F. Meets Fed Spec. OF499, Type B; AWS FB3A, AMS 3410.

Case packaging: (24) 1/4 lb., (24) 1/2 lb., (24) 7 oz. brush-cap, (12) 1 lb., (6) 5 lb., 25 lb., 60 lb. pails.

Stay-Silv® Brazing Flux (black)
Use with silver or other brazing alloys liquidus below 1800°F. Recommended for stainless, heavy parts, and whenever heating cycle is prolonged. For all metals other than aluminum, magnesium, titanium. Meets AMS 3411, AWS 5.31, Class FB3C; Fed Spec. O-F-499D, Type B

Case packaging: (24) 1/2 lb., (12) 1 lb., (6) 5 lb., 30 lb., 60 lb. pails.

<http://www.jwharris.com/jwprod/brazesolderfluxes/>

From: Jim Knapp
To: Jerry Finlinson
Date: 8/9/2005 1:25 PM
Subject: Fwd: LaTech Equipment: Revised CPA and Thermocouple Quote
Attachments: JS050264 Rev 1.pdf

This is the information from La Tach equipment for the Burner front coal pipe temperature. The CPA will take the thermocouple input and output a contact closure at any point we tell it to, within the range we setup.

>>> "Scott H. Andersen" <scott@latechequipment.com> 8/9/2005 12:28:57 PM >>>
Greetings Jim:

Attached is the revised quote with the modifications to the thermocouples you requested. I also added the CPA to the quote. Please contact me if you have any questions or need additional information.

Scott H. Andersen
LaTech Equipment
O: (800) 801-3982
M: (801) 599-5264
F: (801) 044-9848

www.latechequipment.com

IP7_026329

From: "Scott H. Andersen" <scott@latechequipment.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 8/9/2005 3:46 PM
Subject: Re: Fwd: LaTech Equipment: Revised CPA and Thermocouple Quote

The company I am working with is in South Carolina and they are closed for the day. I'll work on getting a sketch first thing tomorrow morning.

----- Original Message -----

From: Jerry Finlinson
To: Jim Knapp ; scott@latechequipment.com
Sent: Tuesday, August 09, 2005 2:04 PM
Subject: Re: Fwd: LaTech Equipment: Revised CPA and Thermocouple Quote

Thanks for the info.

Scott,

Could you forward us a diagram or photo of what the thermocouple looks like and how it connects to the pipe surface? Does it have a head with terminals inside?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
jerry-f@ipsc.com

* Every day above ground is a good day.

>>> Jim Knapp 8/9/2005 1:25:46 PM >>>

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www.latechequipment.com

IP7_026330

From: <Wayne.Buhler@EmersonProcess.com>
To: <jerry-f@ipsc.com>
Date: 8/12/2005 3:30 PM
Subject: Fieldbus Temperature solution
Attachments: 848T PDS.pdf; 3420 PDS.pdf; 848L PDS.pdf

Jerry, attached is the product information on the Fieldbus transmitters we talked about. The 3420 does not have Profibus at this time, but has Modbus or Ethernet outputs. We'll get pricing to you on these items next week.

Thanks again for your time today, and for introducing me to everyone.

Regards,

Wayne Buhler

Rosemount Measurement

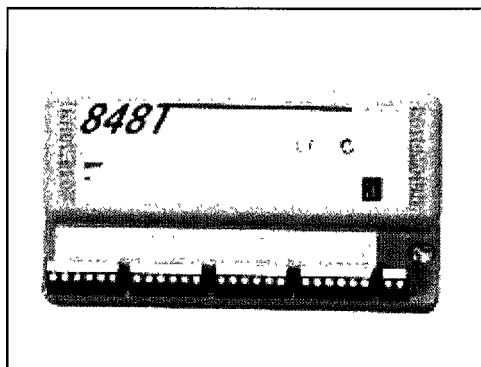
801-565-3738

Cell 801-360-0287

IP7_026331

Rosemount 848T Eight Input Temperature Transmitter with FOUNDATION™ Fieldbus

- Provides significant installation and operation savings for temperature monitoring applications
- Accepts eight independently configurable RTD, thermocouple, ohm, and millivolt inputs
- Mounts anywhere – field hardened, intrinsically safe, and low power
- Provides diagnostic and calculation capabilities
- Interface the Model 848T to existing systems using the Model 3420 Fieldbus Interface Module



Contents

The First Choice in Temperature Monitoringpage Temperature-60
Specificationspage Temperature-61
Product Certificationspage Temperature-65
Dimensional Drawingspage Temperature-67
Ordering Informationpage Temperature-70

ROSEMOUNT

www.rosemount.com


EMERSON
Process Management

The First Choice in Temperature Monitoring

The Model 848T Eight Input Temperature Transmitter will simplify and reduce the cost of a plant's process control architecture. Traditional temperature monitoring methods (wire direct, low cost single input transmitters, and multiplexers) will be eliminated with the introduction of this intrinsically safe, eight input transmitter that mounts beside the process. The use of FOUNDATION™ fieldbus enables this quantum leap in temperature monitoring. Combined with the Model 3420 Fieldbus Interface Module, Model 848T measurements can be interfaced to existing systems.

LOWEST COST SOLUTION

The Model 848T offers the lowest cost solution for temperature monitoring measurements (e.g. distillation columns, tanks, reactors, boilers, etc.). This transmitter can reduce installed costs by as much as 70% per point when compared to traditional sensor wire direct applications.

REDUCES I.S. BARRIER COSTS

For intrinsically safe installations, only one barrier is needed to safely power several Model 848T transmitters. As a result, one barrier can support at least 24 temperature measurement points—resulting in significant savings. The new FISCO (Fieldbus Intrinsically Safe Concept) certification on the Model 848T allows even more measurements per I.S. segment.

EIGHT INDEPENDENT SENSOR INPUTS

The Model 848T accepts eight independently configurable sensor inputs (2- and 3-wire RTDs, thermocouples, mV, and ohm).

MOUNTS VIRTUALLY ANYWHERE

The Model 848T's ambient temperature limits, RF immunity compliance, intrinsic safety approvals, and ability to mount in industrial environments provides optimum mounting flexibility.

DIAGNOSTICS AND MAI FUNCTION BLOCKS

FOUNDATION fieldbus offers inherent diagnostics that provide continuous measurement status (good, bad, or uncertain) as well as sensor failure indication. Also, the Model 848T offers the Multiple Analog Input (MAI) function block. The MAI block allows all eight sensor inputs to be communicated with one function block, resulting in greater network efficiency.

NEW FEATURE:

CONVERTS ANALOG TO FIELDBUS

The Model 848T can accept 4–20 mA inputs and output the value onto FOUNDATION fieldbus. The optional analog connector allows quick connection of the Model 275 HART Communicator for local configuration.

Rosemount Temperature Solutions

Rosemount 644 Temperature Transmitter

Head or rail mount styles available with HART or FOUNDATION fieldbus protocol.

Rosemount 848T Eight Input Temperature Transmitter

Eight input transmitter available with FOUNDATION fieldbus protocol.

Rosemount 3420 Fieldbus Interface Module

Provides an interface between FOUNDATION fieldbus instruments and systems without fieldbus capability using standard interface protocols.

Rosemount 248 Temperature Transmitter

Head mount style (DIN B) available with HART protocol and complete temperature assembly.

Rosemount 244ER Temperature Transmitter

Rail-mount style that is PC-programmable.

Rosemount sensors, thermowells, and extensions

Rosemount has a broad offering of RTD and thermocouples that are designed to meet plant requirements.

Specifications

FUNCTIONAL

Inputs

Eight independently configurable channels including combinations of 2- and 3-wire RTDs, thermocouples, mV, and Ω inputs
4-20 mA inputs using optional connector(s)
All sensor terminals are rated to 42.4 VDC

Outputs

Manchester-encoded digital signal that conforms to IEC 1158-2 and ISA 50.02

Status

If self-diagnostics detect a sensor burnout or a transmitter failure, the status of the measurement will be updated accordingly

Ambient Temperature Limits

-40 to 185 °F (-40 to 85 °C)

Isolation

Input/output isolation is tested to 500 VAC rms (707 VDC)
Input/input isolation between each sensor input connector is tested to 500 VAC rms (707 VDC). Input/input isolation between sensors on the same input connector is 3 VAC at 50 – 60 Hz, 1.5 VDC

Power Supply

Powered over FOUNDATION fieldbus with standard fieldbus power supplies. The transmitter operates between 9.0 and 32.0 V dc, 22 mA maximum. (Transmitter power terminals are rated to 42.4 V dc.)

Transient Protection

The transient protector (option code T1) helps to prevent damage to the transmitter from transients induced on the loop wiring by lightning, welding, heavy electrical equipment, or switch gears. This option is installed at the factory for the Model 848T and is not intended for field installation.

ASME B 16.5 (ANSI)/IEEE C62.41-1991

(IEEE 587), Location Categories A2, B3

6 kV / 3 kA peak (1.2 x 50 μ S Wave 8 x 20 μ S Combination Wave)

6 kV / 0.5 kA peak (100 kHz Ring Wave)

4 kV peak EFT (5 x 50 nS Electrical Fast Transient)

Update Time

Approximately 1.5 seconds to read all eight inputs

Humidity Limits

0–100% non-condensing relative humidity

Turn-on Time

Performance within specifications is achieved in less than 50 seconds after power is applied to the transmitter

Alarms

The AI and ISEL function blocks allow the user to configure the alarms to HI-HI, HI, LO, or LO-LO with a variety of priority levels and hysteresis settings

Backup Link Active Scheduler (LAS)

The transmitter is classified as a device link master, which means it can function as a Link Active Scheduler (LAS) if the current link master device fails or is removed from the segment.

The host or other configuration tool is used to download the schedule for the application to the link master device. In the absence of a primary link master, the transmitter will claim the LAS and provide permanent control for the H1 segment.

FOUNDATION Fieldbus Parameters

Schedule Entries	25
Links	30
Virtual Communications Relationships (VCR)	20

PHYSICAL

Mounting

The Model 848T can be mounted directly onto a DIN rail or it can be ordered with an optional junction box. When using the optional junction box, the transmitter can be mounted onto a panel or to a 2-in. pipe stand (with option code B6).

Entries for Optional Junction Box

No entry

- Used for custom fittings

Cable Gland

- 9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable

Conduit

- 5 plugged 0.86-in. diameter holes suitable for installing 1/2-in. NPT fittings

Materials of Construction for Optional Junction Box

Junction Box Type	Paint
Aluminum	Polyurethane
Plastic	NA
Stainless Steel	NA

Weight

Assembly	Weight		
	oz	lb	kg
Model 848T only	9.60	0.60	0.27
Aluminum ⁽¹⁾	78.2	4.89	2.22
Plastic ⁽¹⁾	58.13	3.63	1.65
Stainless Steel ⁽¹⁾	77.0	4.81	2.18

(1) Add 35.2 oz (2.2 lb, 0.998 kg) for nickel-plated brass glands

Environmental Ratings

NEMA 4X, CSA Enclosure Type 4X, and IP66 with optional junction box

Temperature-61

FUNCTION BLOCKS

Analog Input (AI)

- Processes the measurement and makes it available on the fieldbus segment
- Allows filtering, alarming, and engineering unit changes

Input Selector (ISEL)

- Used to select between inputs and generate an output using specific selection strategies such as minimum, maximum, midpoint, or average temperature
- Since the temperature value always contains the measurement status, this block allows the selection to be restricted to the first "good" measurement

Multiple Analog Input Block (MAI)

- The MAI block allows the eight AI blocks to be multiplexed together so they serve as one function block on the H1 segment, resulting in greater network efficiency

Instantiable Function Blocks

- All the function blocks used by the transmitter are instantiable, meaning the total number of function blocks is only limited by the physical memory available in the transmitter. Since only the instantiable blocks use physical memory, any combination of function blocks can be used at any given time as long as the physical memory size is not violated

PERFORMANCE

The transmitter maintains a specification conformance of at least $\pm 3\%$.

Stability

- $\pm 0.1\%$ of reading or $0.1\text{ }^{\circ}\text{C}$ ($0.18\text{ }^{\circ}\text{F}$), whichever is greater, for 2 years for RTDs
- $\pm 0.1\%$ of reading or $0.1\text{ }^{\circ}\text{C}$ ($0.18\text{ }^{\circ}\text{F}$), whichever is greater, for 1 year for thermocouples

Self Calibration

The transmitter's analog-to-digital circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements

Vibration Effect

Transmitters are tested to the following vibration conditions with no effect on performance

Frequency	Acceleration
10 - 60 Hz	0.21 mm peak displacement
60 - 2000 Hz	3 g

CE Electromagnetic Compatibility Compliance Testing

Meets the criteria under IEC 61326 Amendment 1, 2000

Emissions

- 30–230 MHz, 30 dB (uV/m) at 10 m
- 230–1000 MHz, 37 dB (uV/m) at 10 m

Susceptibility

- | | |
|-------------|------------------------------|
| • ESD | • 4 kV contact discharge |
| | • 8 kV air discharge |
| • Radiated | • 80 – 1000 MHz at 10 V/m AM |
| • Burst | • 1 k V |
| • Surge | • 1 kV line-to-ground |
| • Conducted | • 150 kHz to 80 MHz at 3V |
| • Magnetic | • 50 Hz at 30 A/m |

Accuracy

TABLE 1 Input Options/Accuracy

		Input Ranges		Accuracy Over Range(s)	
Sensor Option	Sensor Reference	°C	°F	°C	°F
2- and 3-Wire RTDs					
Pt 100 (□ = 0 00385)	IEC 751; □ = 0 00385, 1995	-200 to 850	-328 to 1562	± 0.30	± 0.54
Pt 100 (□ = 0 003916)	JIS 1604, 1981	-200 to 645	-328 to 1193	± 0.30	± 0.54
Pt 200	IEC 751, □ = 0 00385, 1995	-200 to 850	-328 to 1562	± 0.54	± 0.98
Pt 500	IEC 751, □ = 0 00385, 1995	-200 to 850	-328 to 1562	± 0.38	± 0.68
Pt 1000	IEC 751; □ = 0 00385, 1995	-200 to 300	-328 to 572	± 0.40	± 0.72
Ni 120	Edison Curve No. 7	-70 to 300	-94 to 572	± 0.30	± 0.54
Cu 10	Edison Copper Winding No. 15	-50 to 250	-58 to 482	± 3.20	± 5.76
Thermocouples—Cold Junction Adds + 0.5 °C to Listed Accuracy					
NIST Type B (Accuracy varies according to input range)	NIST Monograph 175	100 to 300 301 to 1820	212 to 572 573 to 3308	± 6.00 ± 1.54	± 10.80 ± 2.78
NIST Type E	NIST Monograph 175	-50 to 1000	-58 to 1832	± 0.40	± 0.72
NIST Type J	NIST Monograph 175	-180 to 760	-292 to 1400	± 0.70	± 1.26
NIST Type K	NIST Monograph 175	-180 to 1372	-292 to 2502	± 1.00	± 1.80
NIST Type N	NIST Monograph 175	-200 to 1300	-328 to 2372	± 1.00	± 1.80
NIST Type R	NIST Monograph 175	0 to 1768	32 to 3214	± 1.50	± 2.70
NIST Type S	NIST Monograph 175	0 to 1768	32 to 3214	± 1.40	± 2.52
NIST Type T	NIST Monograph 175	-200 to 400	-328 to 752	± 0.70	± 1.26
DIN L	DIN 43710	-200 to 900	-328 to 1652	± 0.70	± 1.26
DIN U	DIN 43710	-200 to 600	-328 to 1112	± 1.70	± 1.26
w5Re26	ASTME 988-96	0 to 2000	32 to 3632	± 1.60	± 2.88
Millivolt Input ⁽¹⁾ —Not approved for use with CSA Option Code I6		-10 to 100 mV		± 0.05 mV	
2- and 3-Wire Ohm Input		0 to 2000 ohms		± 0.90 ohm	

(1) 4–20 mA inputs are scaled to 20 – 100 mV

(2) Multipoint (up to 8 points) thermocouples and RTDs are available for purchase with the Model 848T. Input ranges and accuracy for these sensors will depend on the specific multipoint sensor chosen. For more information, contact your local Rosemount representative.

Accuracy Notes

Differential capability exists between any two sensor types.

For all differential configurations, the input range is X to +Y where

X = Sensor 1 minimum - Sensor 2 max

Y = Sensor 1 maximum - Sensor 2 min

Accuracy for differential configurations:

If sensor types are similar (for example, both RTDs or both thermocouples), the accuracy = 1.5 times worst case accuracy of either sensor type. If sensor types are dissimilar (for example, one RTD and one thermocouple), the accuracy = Sensor 1 Accuracy + Sensor 2 Accuracy.

Model 848T

Product Data Sheet
00813-0100-4697, Rev CA
Catalog 2005

Ambient Temperature Effect

Transmitters may be installed in locations where the ambient temperature is between -40 and 85 °C (-40 and 185 °F)

TABLE 2 Ambient Temperature Effects

NIST Type	Accuracy per 1.0 °C (1.8 °F) Change in Ambient Temperature ⁽¹⁾	Temperature Range (°C)
RTD		
Pt 100 ($\alpha = 0.00385$)	• 0.003 °C (0.0054 °F)	NA
Pt 100 ($\alpha = 0.003916$)	• 0.003 °C (0.0054 °F)	NA
Pt 500, Pt 1000, Ni 120	• 0.003 °C (0.0054 °F)	NA
Pt 200	• 0.004 °C (0.0072 °F)	NA
Cu 10	• 0.03 °C (0.054 °F)	NA
Thermocouple (R = the value of the reading)		
Type B	<ul style="list-style-type: none"> • 0.014 °C • 0.032 °C - (0.0025% of (R - 300)) • 0.054 °C - (0.011% of (R - 100)) 	<ul style="list-style-type: none"> • R ≥ 1000 • 300 ≤ R < 1000 • 100 ≤ R < 300
Type E	• 0.005 °C + (0.00043% of R)	• All
Type J, DIN Type L	<ul style="list-style-type: none"> • 0.0054 °C + (0.00029% of R) • 0.0054 °C + (0.0025% of R) 	<ul style="list-style-type: none"> • R ≥ 0 • R < 0
Type K	<ul style="list-style-type: none"> • 0.0061 °C + (0.00054% of R) • 0.0061 °C + (0.0025% of R) 	<ul style="list-style-type: none"> • R ≥ 0 • R < 0
Type N	• 0.0068 °C + (0.00036% of R)	• A II
Type R, Type S	<ul style="list-style-type: none"> • 0.016 °C • 0.023 °C - (0.0036% of R) 	<ul style="list-style-type: none"> • R ≥ 200 • R < 200
Type T, DIN Type U	<ul style="list-style-type: none"> • 0.0064 °C • 0.0064 °C - (0.0043% of R) 	<ul style="list-style-type: none"> • R ≥ 0 • R < 0
Millivolt	0.0005 mV	NA
2- and 3-wire Ohm	0.0084 ohms	NA

(1) Change in ambient is in reference to the calibration temperature of the transmitter (20 °C (68 °F) typical from the factory)

Ambient Temperature Notes

Examples:

When using a Pt 100 ($\alpha = 0.00385$) sensor input and the transmitter is at 40 °C ambient temperature, temperature effects would be:

$$0.003\text{ °C} \times (40 - 20) = 0.06\text{ °C}$$

Worst case error would be

$$\text{Sensor Accuracy} + \text{Temperature Effects} = 0.30\text{ °C} + 0.06 = 0.36\text{ °C}$$

Total Probable Error =

$$\sqrt{0.30^2 + 0.06^2} = 0.31\text{ °C}$$

Analog to Fieldbus Performance

4–20 mA inputs are scaled to 20 – 100 mV

Accuracy⁽¹⁾ 0.0625% of span

Temperature Effect [0.002% of reading + 0.000625% of span] per 1.0 °C change in Ambient Temperature

(1) To obtain accuracy, the mV input must be calibrated while using the optional analog connector

Product Certifications

HAZARDOUS LOCATIONS CERTIFICATES

North American Approvals

Factory Mutual (FM) Approvals

I5 Intrinsically Safe and Non-Incendive
Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, D, when installed per Rosemount drawing 00848-4402

Temperature Code
T_{amb} = -40 to 60 °C

Non-incendive for use in Class I, Division 2, Groups A, B, C, D (suitable for use with non-incendive field wiring) when installed in accordance with Rosemount Drawing 00848-4402

Temperature Code
T4a (T_{amb} = -40 to 85 °C)
T5 (T_{amb} = -40 to 70 °C)

Indoor Hazardous (Classified) Locations

TABLE 3 FM Approved Entity Parameters

Power/Bus	Sensor
U _i = 30 V	U _o = 12.02 V
I _i = 300 mA	I _o = 13.6 mA
P _i = 1.3 W	P _o = 0.04 W
C _i = 0	C _a = 1.36 µF
L _i = 0	L _a = 160 mH

IE FISCO (Fieldbus Intrinsically Safe Concept) Intrinsic Safety
Intrinsically safe for use in Class I, Division 1, Groups A, B, C, D, when installed in accordance with Rosemount Drawing 00848-4402

Temperature Code
T_{amb} = -40 to 60 °C

Non-incendive for use in Class I, Division 2, Groups A, B, C, D (suitable for use with non-incendive field wiring), when installed in accordance with Rosemount Drawing 00848-4402

Temperature Code
T4a (T_{amb} = -40 to 85 °C)
T5 (T_{amb} = -40 to 70 °C)

TABLE 4 Entity Parameters

Power/Bus	Sensor
U _i = 15 V	U _o = 12.02 V
I _i = 300 mA	I _o = 13.5 mA
P _i = 5.32 W	P _o = 0.04 W
C _i = 0	C _a = 1.36 µF
L _i = 0	L _a = 160 mH

N5 Dust Ignition-Proof Dust Ignition Proof
For use in Class II, III, Division 1, Groups E, F, G Class I, Division 2, Groups A, B, C, D, when installed in accordance with Rosemount Drawing 00848-4402

Temperature Code
T4a (T_{amb} = -40 to 85 °C)
T5 (T_{amb} = -40 to 70 °C)

Canadian Standards Association (CSA) Approvals

I6 Intrinsic Safety and Non-Incendive
For use in Class I, Division 1, Groups A, B, C, D, when installed per Rosemount drawing 00848-4403

Temperature Code
T3C (T_{amb} = -50 to 60 °C)

Suitable for Class I, Division 2, Groups A, B, C, D Rated 42.4 VDC max

TABLE 5 CSA Approved Entity Parameters

Power/Bus	Sensor
U _i = 30 V	U _o = 12.02 V
I _i = 300 mA	I _o = 11.8 mA
C _i = 0	C _a = 1.36 µF
L _i = 0	L _a = 225 mH

IF FISCO (Fieldbus Intrinsically Safe Concept) Intrinsic Safety
For use in Class I, Division 1, Groups A, B, C, D, when installed per Rosemount drawing 00848-4403

Temperature Code
T3C (T_{amb} = -50 to 60 °C)

Suitable for Class I, Division 2, Groups A, B, C, D Rated 42.4 VDC max

TABLE 6 CSA Approved Entity Parameters

Power/Bus	Sensor
U _i = 15 V	U _o = 12.02 V
I _i = 300 mA	I _o = 11.8 mA
C _i = 0	C _a = 1.36 µF
L _i = 0	L _a = 225 mH

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European Approvals

CENELEC Approvals

I1 Intrinsic Safety
Certification Number Baseefa02ATEX0010X
ATEX Marking Ⓔ II 1 G
EEx ia IIC T4 ($T_{amb} = -50$ to 60 °C)
CE 1180

TABLE 7 CENELEC Approved Entity Parameters

Power/Bus	Sensor
$U_i = 30$ V	$U_o = 12.5$ V
$I_i = 300$ mA	$I_o = 66$ mA
$P_i = 1.3$ W	$P_o = 40$ mW
$C_i = 0$	$C_o = 0$
$L_i = 0$	$L_o = 0$

Special Conditions for Safe Use (x):

This apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20. Non-metallic enclosures must have a surface resistance of less than 1G ohm, light alloy or zirconium enclosures must be protected from impact and friction when installed.

The apparatus will not meet the 500V rms isolation test required by Clause 6.4.12 on EN50 020:1994 when the optional transient protection (FISCO) board is fitted and this must be taken into account when installing the apparatus.

IA FISCO (Fieldbus Intrinsically Safe Concept) Intrinsic Safety
Certification Number Baseefa02ATEX0010X
ATEX Marking Ⓔ II 1 G
EEx ia IIC T4 ($T_{amb} = -50$ to 60 °C)
CE 1180

TABLE 8 CENELEC Approved Entity Parameters

Power/Bus	Sensor
$U_i = 17.5$ V	$U_o = 12.5$ V
$I_i = 380$ mA	$I_o = 66$ mA
$P_i = 5.32$ W	$P_o = 40$ mW
$C_i = 0$	$C_o = 0$
$L_i = 0$	$L_o = 0$

Special Conditions for Safe Use (x):

This apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20. Non-metallic enclosures must have a surface resistance of less than 1G ohm, light alloy or zirconium enclosures must be protected from impact and friction when installed.

The apparatus will not meet the 500V rms isolation test required by Clause 6.4.12 on EN50 020:1994 when the optional transient protection (FISCO) board is fitted and this must be taken into account when installing the apparatus.

N1 CENELEC Type n
Certification Number BAS01ATEX3199X
ATEX Marking Ⓔ II 3 G
EEx nL IIC T5 ($T_{amb} = -40$ to 65 °C)

TABLE 9 Entity Parameters

Power/Bus	Sensor
$U_i = 42.4$ V	$U_o = 5$ V
$C_i = 0$	$I_o = 2.5$ mA
$L_i = 0$	$C_o = 1000$ µF
	$L_o = 1000$ mH

Special Conditions for Safe Use (x):

- Provisions shall be made, external to the apparatus, to prevent the rated voltage (42.4 V dc) being exceeded by transient disturbances of more than 40%.
- The ambient temperature range of use shall be the most restrictive of the apparatus, cable gland, or blanking plug.

NC CENELEC Type n Component
Certification Number BAS01ATEX3198U
ATEX Marking Ⓔ II 3 G
EEx nL IIC T4 ($T_{amb} = -50$ to 85 °C)
EEx nL IIC T5 ($T_{amb} = -50$ to 70 °C)

Special Conditions for Safe Use (x):

- The component must be housed in a suitably certified enclosure.
- Provision shall be made, external to the component, to prevent the rated voltage (42.4 V dc) being exceeded by transient disturbances of more than 40%.

ND CENELEC Dust Ignition Proof
Certification Number BAS01ATEX1315X
ATEX Marking Ⓔ II 1 D
T90C ($T_{amb} = -40$ to 65 °C) IP66

Special Conditions for Safe Use (x):

- The user must ensure that the maximum rated voltage and current (42.2 volts, 22 mA, DC) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category "ib" circuit according to EN50020.
- Component approved EEx e cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
- Any unused cable entry holes must be filled with component approved EEx e blanking plugs.
- The ambient temperature range of use shall be the most restrictive of the apparatus, cable gland, or blanking plug.

Australian Approvals

Standard Australia Quality Assurance Service (SAA)

NOTE

Consult factory for SAA availability.

I7 Intrinsic Safety
Ex ia IIC
N7 Type n
Ex n IIC

Brazilian Approval

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

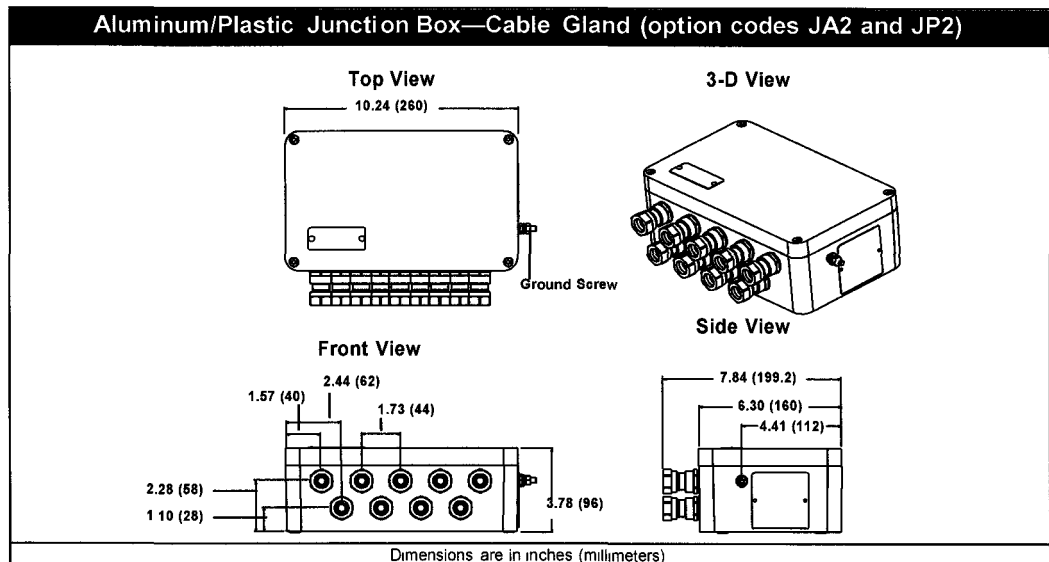
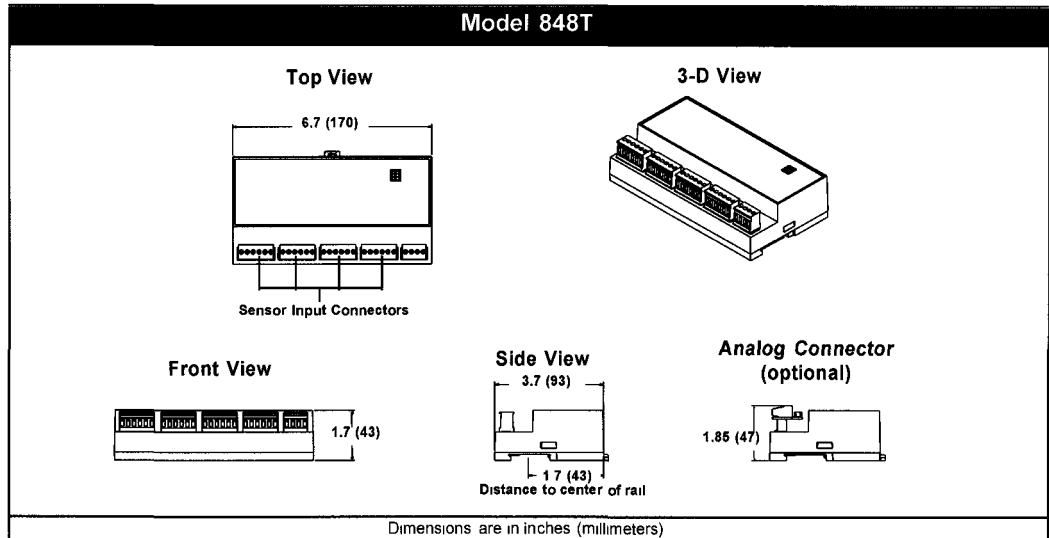
NOTE

Consult factory for CEPEL availability.

I2 Intrinsic Safety
BR-Ex ia IIC T4

Dimensional Drawings

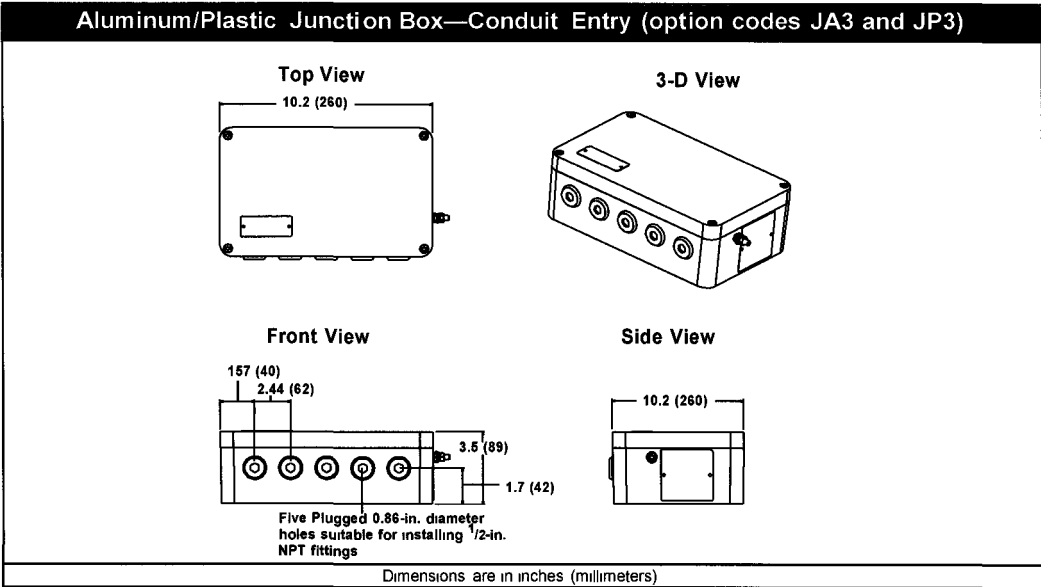
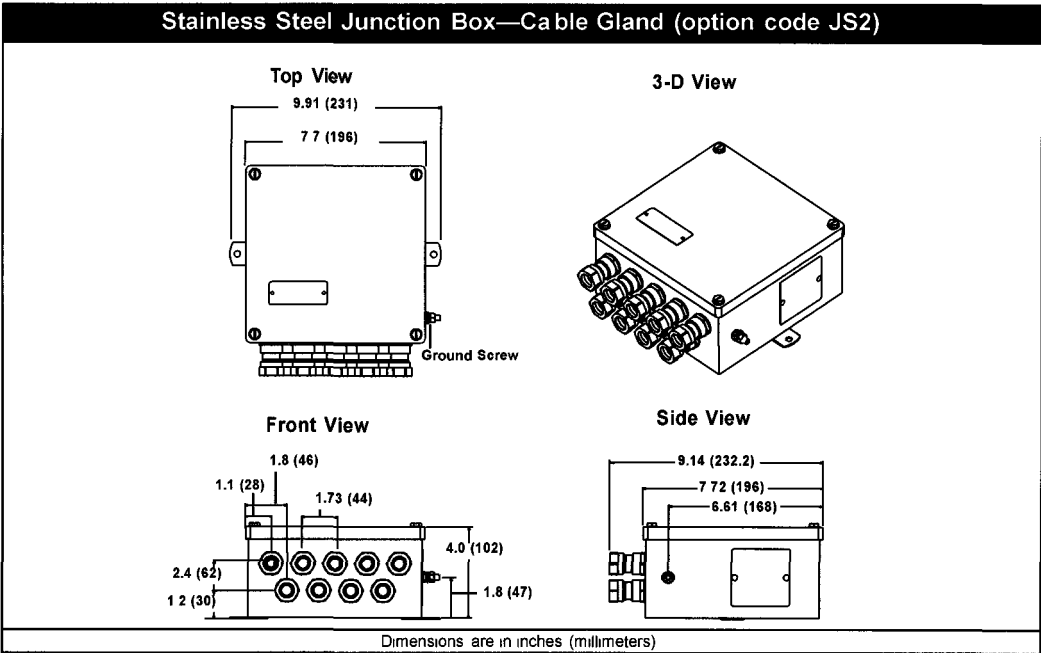
Junction Boxes with no entries (option codes JP1, JA1, and JS1)— external dimensions are the same as those outlined for the other junction box materials in this section



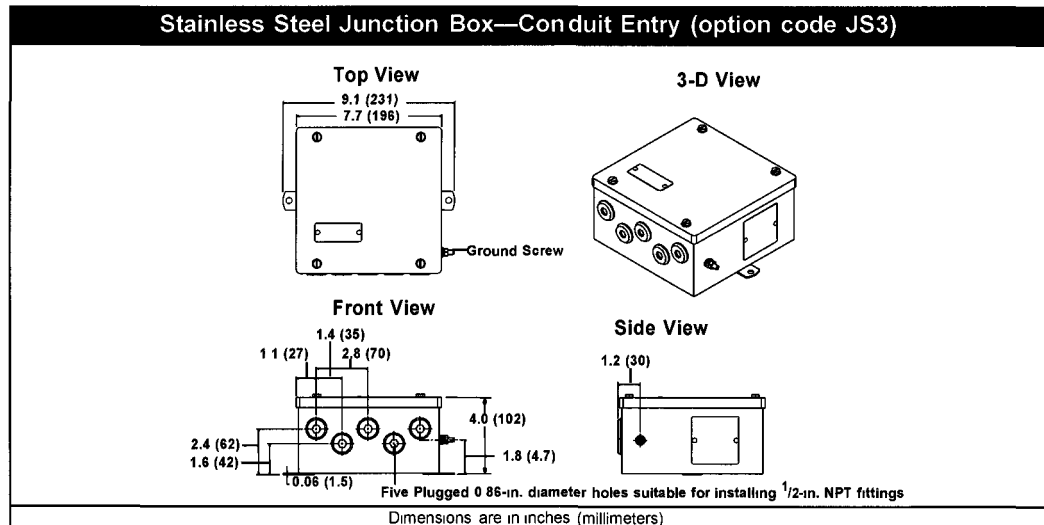
Temperature-67

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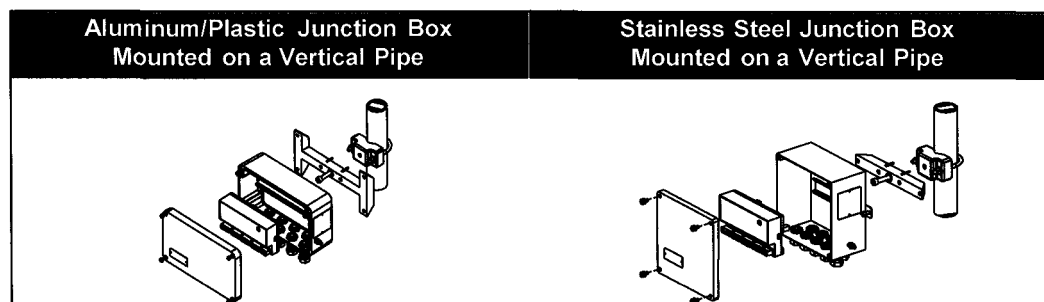
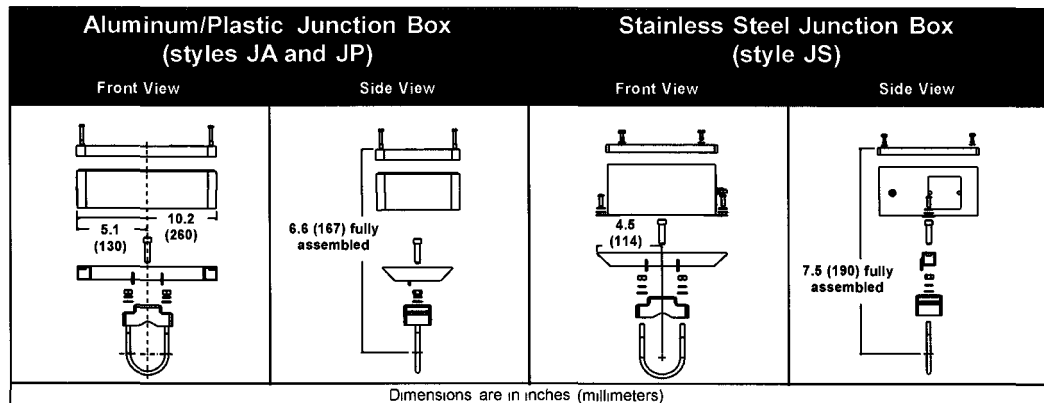
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Temperature-68



MOUNTING OPTIONS



Model 848T

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Ordering Information

Model	Product Description	
848T	Eight Input Temperature Transmitter	
Code	Communications Protocol	
F	FOUNDATION™ fieldbus digital signal (includes AI, MAI, and ISEL function blocks, and Backup Link Active Scheduler)	
Code	Product Certifications ⁽¹⁾	Rosemount Junction Box required?
I5	FM Intrnsic Safety and Non-Incendive (Class I, Division 2)	No
IE	FM FISCO (Fieldbus Intrinsically Safe Concept) Non-incendive Safety (Class I, Division 2)	No
N5	FM Dust Ignition-Proof (Class I, Division 2) Dust Ignition Proof	Yes
I6	CSA Intrnsic Safety and Non-Incendive (suitable for Class I, Division 2)	No
IF	CSA FISCO (Fieldbus Intrinsically Safe Concept) Intrinsic Safety (suitable for Class I, Division 2)	No
I1	CENELEC Intrnsic Safety	No
IA	CENELEC FISCO (Fieldbus Intrinsically Safe Concept) Intrnsic Safety	No
N1	BASEEFA/CENELEC Type n	Yes
NC	CENELEC Type n Component	No ⁽²⁾
ND	CENELEC Dust Ignition Proof	Yes
I7	SAA Intrnsic Safety	No
N7	SAA Type n	No ⁽³⁾
I2	CEPEL Intrnsic Safety	No
NA	No Approval	No
Code	Input Types	
S001	RTDs and Thermocouples	
S002 ⁽⁴⁾	RTDs, Thermocouples, and 4–20 mA	
Code	Options	
T1	Transient Protection	
B6	Mounting Bracket for 2-in. pipe mounting and for panel mounting – SST bracket and bolts	
	Non Explosion-Proof Junction Box	
	<i>Plastic Junction Box</i>	
JP1	No Entries	
JP2	Cable Glands (9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable)	
JP3	Conduit Entries (5 plugged holes, suitable for installing 1/2-in NPT fittings)	
	<i>Aluminum Junction Box</i>	
JA1	No Entries	
JA2	Cable Glands (9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable)	
JA3	Conduit Entries (5 plugged holes, suitable for installing 1/2-in NPT fittings)	
	<i>Stainless Steel Junction Box</i>	
JS1	No Entries	
JS2	Cable Glands (9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable)	
JS3	Conduit Entries (5 plugged holes, suitable for installing 1/2-in NPT fittings)	
	Configuration⁽⁵⁾	
F5	50 Hz Line Voltage Filter	
Typical Model Number: 848T F I5 S001 T1 B6 JA2		

(1) Consult factory for availability

(2) The Model 848T ordered with option code NC is not approved as a stand-alone unit. Additional system certification is required.

(3) The Model 848T must be installed so it is protected to at least the requirements of IP54. All listed Junction Boxes fulfill this requirement.

(4) Not available with product certifications

(5) Configuration is the same for all eight inputs

Temperature-70

IP7_026343

Transmitter Tag

Hardware

- tagged in accordance with customer requirements
- permanently attached to the transmitter

Software

- the transmitter can store up to 30 characters
- if no characters are specified, the first 30 characters of the hardware tag will be used

Sensor Tag

Hardware

- a provided plastic tag to record identification of eight sensors
- this information can be printed at the factory upon request
- in the field, the tag can be removed, printed onto, and reattached to the transmitter

Software

- if sensor tagging is requested, the Sensor Transducer Block sensor_sn parameters will be set at the factory
- the sensor_sn parameters can be updated in the field

Standard Configuration Settings

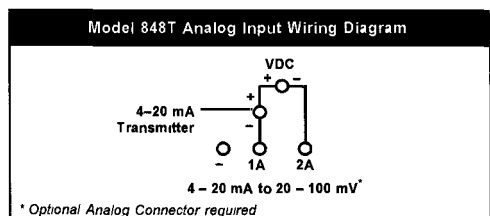
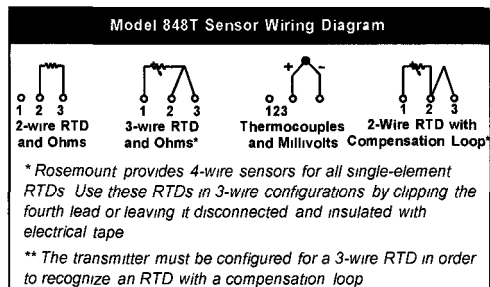
Sensor Type ⁽¹⁾	Pt 100 ($\alpha = 0.00385$), 3-wire RTD
Damping ⁽¹⁾	2 seconds
Measurement Units ⁽¹⁾	°C
Output ⁽¹⁾	Linear with Temperature
Line Voltage Filter ⁽¹⁾	60 Hz
Temperature Specific Blocks	<ul style="list-style-type: none"> • Measurement Transducer Block (1) • Sensor Transducer Block (8) • Differential Transducer Block (4)
FOUNDATION fieldbus Function Blocks	<ul style="list-style-type: none"> • Analog Input (8) • Multiple Analog Input (1) • Input Selector (4)

(1) For all eight sensors

Custom Configuration

Custom configurations are to be specified when ordering. This configuration must be the same for all eight sensors

Wiring



Transmitter Configuration

The transmitter is available with the standard configuration setting. The configuration settings and block configuration may be changed in the field with the Fisher-Rosemount Systems DeltaV®, with AMSinside, or other FOUNDATION fieldbus host or configuration tool.

Standard Configuration

Unless otherwise specified, the transmitter will be shipped as follows for all eight sensors

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Model 848T

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FOUNDATION is a trademark of the Fieldbus Foundation
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Emerson Process Management

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Emerson Process Management Asia

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Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
AP.RMT-Specialist@emersonprocess.com

www.rosemount.com

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IP7_026345

From: <Eric.Eulberg@EmersonProcess.com>
To: <JERRY-F@IPSC.COM>
CC: <Wayne.Buhler@EmersonProcess.com>
Date: 8/19/2005 8:05 AM
Subject: Rosemount Quotation 1577070
Attachments: 1577070.PDF

Jerry,

Please find the attached quotation for your review.

Regards,

Nick Wilson for Eric Eulberg
Inside Sales Representative
Emerson Process Management
Rosemount Inc
Phone: 800-999-9307 Fax: 952-906-8813

IP7_026346



Quote # 1577070 **Rev:**

Date: 19-AUG-05

Time: 09:00 AM

To: JERRY FINLINSON
INTERMOUNTAIN POWER SERVICE CORP

Phone: 435-864-6466
Fax: --

From: EULBERG, ERIC
Inside Sales Representative

Phone: 800-999-9307

CC: BUHLER, WAYNE
Field Sales Representative

Phone:

Re: RFQ: 848 3420

Fax: 952-906-8813

Quote #1577070 **Revision:**

Number of Pages Including This Cover Sheet 4

We are pleased to submit the attached quotation for your review. Should you have any questions, please do not hesitate to contact us at the above number.

Thank you for your consideration of Rosemount. We look forward to satisfying your instrumentation needs.

Best Regards,

Nick Wilson for Eric Eulberg
Inside Sales Representative
Rosemount Customer Central

ROSEMOUNT

Quotation Number: 1577070 *Rev:*

IP7_026347



Rosemount Inc.
8200 Market Boulevard
Mail Station PG17
Chanhassen, MN 55317-9687
Phone: 1-800-999-9307
Fax: 952-906-8813

Quotation Number 1577070 Rev:

TO: INTERMOUNTAIN POWER SERVICE CORP
850 WBRUSH WELLMAN RD
DELTA, UT 84624-9522

Attn: JERRY FINLINSON
Phone: 435-864-6466
FAX: --

Prepared by: EULBERG, ERIC
Salesperson: BUHLER, WAYNE
Quotation Date: 18-AUG-05
Customer Reference: RFQ: 848 3420
Payment Terms: NET 30 DAYS
Firm Proposal For: 60 Days
Trade Terms: FCA
Ship Date: 2 WEEKS ARO
Freight & Handling: PREPAID AND ADD
Ultimate Destination: United States

CUST LINE	ITEM	QTY	ITEM DESCRIPTION	UNIT \$	TOTAL US \$
	1	6	848TFNAS001 EIGHT INPUT, TRANSMITTER, MULTISENSOR F Communications Foundation Fieldbus, Communications Protocol, Includes 8 Protocol, Transmitter Al&3 Isel Blocks & Backup Link Activie Output NA Product Certification No Approval Required S001 Input Type Input Type, RTD's, and Thermocouples Qty/Cfg Calibration 6 0 to 100 DEGC 13	\$1,886.00	\$11,316.00
	2	6	848LFANAS001 Fieldbus Logic Transmitter F Communications Foundation fieldbus digital signal Protocol A Power Input Bus and I/O Power (4-wire) NA Product Certifications No Approval S001 Input Type 8 - Dry Contact Inputs / 4 - 9 to 32 VDC Outputs	\$1,278.00	\$7,668.00
	3	1	3420A1A1N0 FIELDBUS INTERFACE MODULE A Power Input Options 24 Vdc Power Input 3420 1 Output Options 3420 Rs485 + Ethernet A Fieldbus Input Options One H1 Fieldbus Segment 3420 1 Power Conditioner One Power Conditioner & Terminator MounTEd In the 3420 Terminator for ea Housing Segment 3420	\$3,111.00	\$3,111.00

ROSEMOUNT

IP7_026348

CUST LINE	ITEM	QTY	ITEM DESCRIPTION	UNIT \$	TOTAL US \$
	3	1	(Continued)		
			FIELD BUS INTERFACE MODULE		
		N	Rs-485 Communication Options 3420	None	
		0	Ethernet Communication Options 3420	None	
				Quote Total	\$22,095.00

Notes :

****THANK YOU FOR YOUR INQUIRY!! TO HELP US SERVE YOU BETTER, PLEASE REFERENCE QUOTE # 1577070 Rev: WHEN CALLING FOR INFORMATION OR PLACING YOUR ORDER.**

**Please submit
Purchase Order to:**

**Rosemount Inc.
8200 Market Boulevard
Mail Station PG17
Chanhassen, MN 55317-9687
Phone : 1-800-999-9307
Fax : 952-906-8813**

"No statement or condition contained in any order submitted by buyer which modifies, adds to, is different from or inconsistent with any term or condition of this Quotation shall be binding on the Seller unless the Seller shall have expressly consented in writing to such statement or condition. This quotation is subject to the warranties and disclaimers set forth in the attached Emerson Process Management Terms and Conditions of Sale and no others, unless Seller and Buyer have entered into a separate written agreement."

Prepared by: **EULBERG, ERIC**

Inside Sales Representative

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Chan.RMD-Customerfeedback@EmersonProcess.com

ROSEMOUNT

IP7_026349



TERMS AND CONDITIONS OF SALE

These terms and conditions, the attendant quotation or acknowledgment, and all documents incorporated by reference herein binds Seller (i.e. Fisher Controls International LLC, Rosemount Inc., Fisher-Rosemount Systems Inc., or other Emerson Process Management Group Company) hereinafter Seller, and the buyer, hereinafter Buyer, and constitutes the entire agreement (Agreement) between Buyer and Seller for the provision of services (Services) and/or the sale of goods (Goods) including (except as provided in Section 11) firmware incorporated therein.

1. PRICES: Unless otherwise specified by Seller, Seller's price for the Goods and/or Services shall remain in effect for thirty (30) days after the date of Seller's quotation or acceptance of the order for the Goods/Services, whichever is delivered first, provided an unconditional, complete authorization for the immediate manufacture and shipment of the Goods and/or provision of Services pursuant to Seller's standard order processing procedures is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Goods/Services to Seller's price in effect for the Goods/Services at the time the order is released to final manufacture. Notwithstanding any of the foregoing to the contrary, the price for Goods/Services sold by Seller, but manufactured by others, shall be Seller's price in effect at the time of shipment to Buyer.

2. DELIVERY, ORDER ACCEPTANCE AND DOCUMENTATION: All shipping dates are approximate and are based upon Seller's prompt receipt of all necessary information from Buyer to properly process the order. Notwithstanding any provisions to the contrary in this or other documents related to this transaction, and regardless of how price was quoted, whether FOB, FAS, CIF or otherwise, legal title to the Goods and risk of loss thereto shall transfer to Buyer as follows for sales in which the end destination of the Goods is within the United States, upon delivery to the freight carrier at the shipping point, for sales in which the end destination of the Goods is outside of the United States, immediately after the Goods have passed beyond the territorial limits of the United States. Seller shall provide Buyer with that data/documentation which is specifically identified in the quotation. If additional copies of data/documentation or non-standard data/documentation are to be provided by Seller, they shall be provided to Buyer at Seller's price then in effect.

3. EXCUSE OF PERFORMANCE: Seller shall not be liable for delays in performance or for non-performance due to acts of God, war, riot, fire, terrorism, labor trouble, unavailability of materials or components, explosion, accident, compliance with governmental requests, laws, regulations, orders or actions, or other unforeseen circumstances or causes beyond Seller's reasonable control.

4. TERMINATION AND SUSPENSION BY BUYER: Buyer may terminate or suspend its order for any or all of the Goods/Services covered by the Agreement, provided that Buyer gives Seller reasonable advance written notice of such termination or suspension and reimburses Seller for all losses, damages, costs and expenses arising from such termination or suspension.

5. LIMITED WARRANTY: Subject to the limitations contained in Section 6 herein, Seller warrants that the licensed firmware embodied in the Goods will execute the programming instructions provided by Seller, and that the Goods manufactured or Services provided by Seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, correct any errors that are found by Seller in the firmware or Services or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources or environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by Seller. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel and representatives for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced by Seller during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by Seller. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

6. LIMITATION OF REMEDY AND LIABILITY: SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, REVENUE OR USE AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF BUYER'S CUSTOMERS.

7. PATENTS: Subject to the limitations contained in Section 5, Seller shall defend any suits brought against Buyer based on a claim that use of the Goods manufactured by Seller constitutes an infringement of a valid patent of the United States, and shall pay any damages awarded therein against Buyer, provided that Buyer promptly notifies Seller in writing of the filing of such suit or

the threat thereof, permits Seller to control completely the defense or compromise of such claim of infringement, and provides all reasonable assistance and cooperation requested by Seller for the defense of such suit. In the event that only the Goods manufactured by Seller are held to be infringing in such suit and their use is enjoined, Seller shall, at its sole option and expense, provide a commercially reasonable alternative, including, but not limited to, procuring for Buyer the right to continue using the Goods, replacing them with a non-infringing product or modifying them so they become non-infringing. Buyer agrees that Seller shall not be liable for infringement, and that Buyer shall fully indemnify Seller therefore, if infringement is based upon the use of Goods in connection with goods not manufactured by Seller or in a manner for which the Goods were not designed by the Seller or if the Goods were not designed by the Seller or if the Goods were designed by the Buyer or were modified by or for the Buyer in a manner to cause them to become infringing.

8. INSTALLATION: Buyer shall be responsible for receiving, storing, installing, starting up and maintaining all Goods. Seller shall provide a quotation for services to assist Buyer in these functions if requested.

9. TAXES: Any tax or governmental charge payable by the Seller because of the manufacture, sale or delivery of the Goods, or provision of Services, may at Seller's option be added to the price herein specified. The foregoing shall not apply to taxes based upon Seller's net income.

10. TERMS OF PAYMENT: Subject to the approval of Seller's Credit Department, terms are F.O.B. shipping point, net 30 days from date of Seller's invoice in U.S. currency, except for applicable milestone payments covered below or export shipments for which Seller may require other arrangements. Freight charges may include shipping and handling charges, and Buyer shall pay all such charges. If any payment owed to Seller hereunder is not paid when due, it shall bear interest, at a rate to be determined by Seller which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is received. Seller shall have the right, among other remedies, either to terminate the Agreement or to suspend further deliveries under this and/or other agreements with Buyer in the event Buyer fails to make any payment hereunder when due. Buyer shall be liable for all expenses attendant to collection of past due amounts, including attorneys' fees.

Unless otherwise provided in Seller's written quotation, periodic milestone payments shall be made by Buyer when the purchase price of this Agreement exceeds \$100,000. In such cases, invoices shall be issued by Seller and paid by Buyer based on the following milestones: Milestone 1: 30% of price upon acceptance of order by Seller. Milestone 2: 30% of price upon release by Seller of approved bills of material to manufacturing for assembly. Milestone 3: 40% of price upon shipment of the Goods by Seller. Seller reserves the right to designate additional Milestones where the Agreement provides for Services in excess of \$50,000.

11. SOFTWARE AND FIRMWARE: Notwithstanding any other provision herein to the contrary, Seller or applicable third party owner shall retain all rights of ownership and title in its respective firmware and software, including all copyrights relating to such firmware and software and all copies of such firmware and software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, royalty free license to use firmware and software, and copies of firmware and software, incorporated into the Goods only in conjunction with such Goods and only at the Buyer's plant site where the Goods are first used. Buyer may negotiate with Seller separate licenses to use such copies of firmware and software at other plant sites. Buyer's use of certain firmware (as specified by Seller) and all other software shall be governed exclusively by Seller's and/or third party owner's applicable license terms.

12. BUYER SUPPLIED DATA: To the extent that Seller has relied upon any specifications, information, representation of operating conditions or other data or information supplied by Buyer to Seller in the selection or design of the Goods and/or provision of the Services and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer and relied upon by Seller, any warranties or other provisions contained herein which are affected by such conditions shall be null and void, unless otherwise mutually agreed upon in writing.

13. EXPORT/IMPORT: Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which items may be supplied, will apply to its receipt and use of Goods and Services. In no event shall Buyer use, transfer, release, import, export or reexport Goods in violation of such applicable laws, regulations, orders or requirements.

14. GENERAL PROVISIONS: (a) Buyer shall not assign its rights or obligations under the Agreement without Seller's prior written consent. (b) There are no understandings, agreements or representations, express or implied, not specified in the Agreement. (c) No action, regardless of form, arising out of transactions under the Agreement, may be brought by either party more than two (2) years after the cause of action has accrued. (d) Any modification of these terms and conditions must be set forth in a written instrument signed by a duly authorized representative of Seller. (e) The Agreement is formed and shall be construed, performed and enforced under the laws of the State of Missouri. However, Buyer and Seller agree that the proper venue for all actions arising under the Agreement shall be only in the State where the Goods involved in such actions were manufactured. (f) UNLESS OTHERWISE SPECIFICALLY PROVIDED IN SELLER'S QUOTATION, GOODS AND SERVICES HEREUNDER ARE NOT INTENDED FOR USE IN ANY NUCLEAR OR NUCLEAR RELATED APPLICATIONS. Buyer (i) accepts Goods and Services in accordance with the restriction set forth in the immediately preceding sentence, (ii) agrees to communicate such restriction in writing to any and all subsequent purchasers or users and (iii) agrees to defend, indemnify and hold harmless Seller from any and all claims, losses, liabilities, suits, judgments and damages, including incidental and consequential damages, arising from use of Goods and Services in any nuclear or nuclear related applications, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability. (g) The 1980 United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement. (h) If any provision of the Agreement is invalid under any statute or rule of law, such provision, to that extent only, shall be deemed to be omitted without affecting the validity of the remainder of the Agreement.

From: <Wayne.Buhler@EmersonProcess.com>
To: <JERRY-F@IPSC.COM>
Date: 8/19/2005 2:05 PM
Subject: RE: Rosemount Quotation 1577070 IPP

Jerry, You would need either item 1 or item 2 depending on what you decide to do. Item one is for RTD's and Thermocouples, item 2 is for switches.

Regards,

Wayne Buhler

Rosemount Measurement

801-565-3738

Cell 801-360-0287

-----Original Message-----

From: Eulberg, Eric [EPM/RTC]
Sent: Friday, August 19, 2005 8:03 AM
To: JERRY-F@IPSC.COM
Cc: Buhler, Wayne [EPM/RTC]
Subject: Rosemount Quotation 1577070 IPP

Jerry,

Please find the attached quotation for your review.

Regards,

Nick Wilson for Eric Eulberg
Inside Sales Representative
Emerson Process Management
Rosemount Inc
Phone: 800-999-9307 Fax: 952-906-8813

IP7_026351

From: Garry Christensen
To: Jerry Finlinson
Date: 11/28/2005 6:06 AM
Subject: Unit 1 D row Combustion Index

Jerry, since D row Unit 1 came back on line the combustion index has not been working. Perhaps you have an idea. Thanks

From: Jerry Finlinson
Start: 1/24/2006
Due: 1/24/2006
Subject: Discussed IBAM tubing repair with Will Lovell. He plans to have mechanics weld repair.

Will ask if they need new fitting ordered, or if they can reuse the existing fittings.

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Andy Chew" <achew@airmonitor.com>, "Ken Hall" <khpquip@earthlink.net>
Date: 2/8/2006 1:08 PM
Subject: RE: IPSC U2 IBAM tubing repair recommendation wanted

Jerry,

We have IBAM customers that have Heli-arc welded the interconnect fittings and those that have used compression fittings (Swagelok). Either can be completely reliable, but the Heli-arc welding would provide the most assurance over the long haul and is the preference for us and the majority of our customers.

A few customers have chosen compression fittings because they either did not want to weld or wanted to be able to remove and inspect/replace the IBAMs easily. We do not see a need to inspect the IBAMs and typically they only require replacement when something dramatic has happened to the burner (which would necessitate significant or wholesale repair to other burner items).

Your method for Heli-arc welding the existing installations sounds reasonable. Andy and I discussed briefly and we (he) may have some ideas to make the job a little easier.

The most critical item (you already know this and I sound like Captain Obvious) is performing leak checks prior to the Unit coming back online. If you do go the route of compression fittings, expect as many as 50-75% of them to leak upon initial installation (we have seen this with other customers). That installation process will involve going back to re-torque the fittings and eliminate the leaks.

We're here to help.

Please let us know if you have any questions or concerns.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Tuesday, January 31, 2006 2:16 PM
To: achew@airmonitor.com; mmaragos@airmonitor.com; pdave@airmonitor.com; <Ken Hall; dearley@nc.rr.com>
Cc: sal@advancedburner.com; Aaron Nissen; Bill Morgan; Dean Wood; Garry Christensen; Jim Knapp; Will Lovell
Subject: IPSC U2 IBAM tubing repair recommendation wanted

Air Monitor,

We have had significant problems with our IBAM tubing that was silver brazed on the ABT burners 2 years ago. On our last short outage I got inside one windbox and found several broken and leaky fittings. I didn't have time to check them all. We

IP7_026354

fixed what we could,
but we can't trust the data.

We'd like to get in this upcoming major outage in April and fix it better with heliarc welding.
Our welder didn't think it would be too easy to clear off the old silver brazing in preparation for heliarc welding. They propose two options:

1) Replace the crosses and couplers with swagelok compression fittings. These would be easiest to install. Do you have experience with compression fittings? Would they likely loosen and leak?

2) Replace them with heliarc welded crosses and couplers, but place an additional coupler about 1.5 inches out on each leg of the cross to get to a cleaner tubing area. This would be adding 8 additional couplers to the system. We could preweld the cross and couplers in the shop, so they would be good welds.

We'd like your improved recommendation. What do other plants do for a robust installation?

We like the heli arc welding on the latest ABT burner tubing. (see attached photos)

Thanks, Jerry

7/27/05

Jerry,
After reviewing the photos and looking further into our fabricator's (PCW) silver brazing application, I do not see any reason that the silver brazed joints would be failing over time due to the 700 degree secondary air temperature. This is well below the temperature rating of the brazing material used (PCW used J.W. Harris "Safety-Silv 50N" applied with "Stay-Silv Flux-black") which has a Solidus-Liquidus range of 1220-1305 deg F. Reference attached "Braze/Solder Product List" which indicates that this is the correct application for stainless and temperatures.

The only other reasons I can think of that could cause the brazed joints to fail is either damage by handling during the installation of the burner in the windbox, or due to secondary air flyash chemistry corroding joints. Since the weld repaired joints seem to be holding up, and not knowing the flyash chemistry at this point, I would recommend repairing leaks in the future with Heliarc method IPSC used to make original repairs.

Note that we will also use Heliarc to make the IBAM tube/fitting welds on the replacement burner for IPSC PO No. 06-48595. Also if you could let me know the chemistry of the ash in secondary air, I would be happy to follow-up with J.W. Harris to see if this could possibly cause corrosion of the brazed joints.
Regards,
Sal

-----Original Message-----

From: Sal Ferrara [mailto:sal@advancedburner.com]
Sent: Wednesday, June 01, 2005 11:15 AM
To: Jerry Finlinson
Subject: RE: IPSC U2 Burner IBAM silver brazing failure

Jerry,
I don't mean to keep you hanging. I am looking into this and will respond back with our recommendation as soon as possible.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, May 26, 2005 10:18 AM
To: sal@advancedburner.com; tarkel@advancedburner.com; mmrargos@airmonitor.com; khpquip@earthlink.net
Cc: Aaron Nissen; Bill Morgan; Garry Christensen; Howard Scott; Jerry Finlinson; Jim Knapp; John Fritzges; Jon Christensen; Ken Nielson; Nathan
Crop; Pam Bahr
Subject: IPSC U2 Burner IBAM silver brazing failure

FYI,

During our Feb05 unit 2 outage I went in to inspect the D1 burner which had a bad IBAM signal. At that time we found 2 broken manifold pipes. They were weld repaired, but the signal was still bad. So this week during our tube leak outage, I went in to inspect and found those weld repairs still good, but there were 6 other leaky fittings in the stainless steel couplings and T's. This was originally silver brazed by

IP7_026356

Advanced Burner at
their manufacturing shop. We found many leaks upon delivery and they
were
rebrazed on site.

Now we find that apparently that brazing material is not holding up to
the
700 F temp
in the secondary air windboxes and new leaks are developing. PCW's
assurances
that the joints were all good and will not leak has proven to be
incorrect. So we
need to remedy the situation. We'll need to plan
a major project to go in on the next major outage and do a proper weld
on
all those
fittings. What type of weld would you advise? Heliarc?

Do you provide warranty coverage for this type of failure?

Please advise.

Below is some emails that we exchanged on the original problem in Feb
2004.

At that time we were advised by ABT that silver brazing would be able
to
withstand temps up to 1100 F. Notice in the enclosed photos that the
brazing
appears to be flaking off on the outside. Also when our guys do a weld
on
one
side of the fitting then the brazing melts out on the otherside, so they
must do it
all the way around.

Jerry

Jerry,

I am sure you will let us know what ABT proposes to remedy the tubing
joint
leaks.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

IP7_026357

Sent: Thursday, February 05, 2004 5:46 PM
To: sal@advancedburner.com; Bill Morgan; Howard Hamilton; James Nelson;
Ken Nielson; Phil Hailes
Cc: Andy Chew; Matt Maragos; khpquip@earthlink.net
Subject: ABT burner pitot manifold leak photos - AMC WO NO 50633

FYI,

Today I observed TEI Jon McCarra doing a leak check on the ABT burner pitot manifold silver brazing welds.

Each manifold has 11 joints on the total pressure (TP) and 11 joints on the static pressure (SP).

2 on each side of the 3 pitot couplings, 4 on each side of the cross and a pipe to tubing joint.

I have enclosed representative photos of the leak check soap bubbles showing leaks, some leaks were small, a couple were very large.

Here's a list of the leaks we found on the 9 burners staged on the rear of the boiler.

7th floor

CW6 - SP, 1 leak on coupling to pitot

CW3 - TP = 3 leaks, pipe to tubing, top leg of cross, 11:00 pitot coupling

CW14 2 leaks, SP = bottom 6:00 coupling, TP = bottom 6:00 coupling

6th floor

CW8 - 1 leak, TP - top of cross

CW4 - 2 leaks, SP tube to pipe, and 11:00 coupling,

CW5 - 8 leaks, SP - 3 sides of cross, top 11:00 coupling, TP = 2 sides of cross, bottom 6:00 coupling

5th floor

All three burners had no leaks, they appeared to be better welded.

As a percent of burners, 66% of the burners had leaks in the manifold.

As a percent of joints from the total of $9 \times 22 = 198$ joints, $17/198 = 8.5\%$ of joints.

What weld repair remedy would you suggest?

We will check the burners on the boiler front tomorrow.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624

IP7_026358

435-864-6466 fax 0776/6670
jerry-f@ipsc.com

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

A truly happy person is one who can enjoy the scenery on a detour.

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/4/2004 8:38:38 AM >>>

Jerry,

The tube joints are joined by silver brazing since the soldering process has too low of a temperature rating for our purpose. Andy Chew has it backwards in his response to you. Silver soldering is rated for a working temperature in the 400 to 500°F range. Silver brazing is typically rated upwards of 1100°F working temperature range. Concerning the appearance of the brazed joints, PCW did not clean all the joints in which case you see some of the flux material used in the brazing process. PCW has assured us that the joints are good and will not leak.

Let me know if you have other questions.

Regards,

Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Tuesday, February 03, 2004 8:17 PM

To: Howard Hamilton; James Nelson; Phil Hailes

Cc: sal@advancedburner.com

Subject: Fwd: RE: ABT burner pitot photos - AMC WO NO 50633

FYI,

Here's Air Monitor's response to the photos of the IBAM manifold welding.

Hopefully, they did use silver solder, not brazing.

Sal, please advise.

Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 2/3/2004 4:34:23 PM >>>

IP7_026359

Jerry,

Air Monitor agreed to ABT's suggestion of using a sealing method other than

Heliarc welding. Originally they mentioned brazing but we insisted on silver solder because the temperature rating of the silver solder joint is

much higher than that of brazing. You should ask ABT about this but it appears they did not clean the solder joints. They may be good joints and

just not look very pretty. You want to make sure they are pressure tested

before going into service. When we modified the probes we only added additional Total pressure sensor holes to the production manifolds.

Additional Static pressure sensor holes were determined to be not necessary

as they did not improve the performance accuracy of the device. We will be

providing an as built drawing which will include the pressure sensor details. Again, I am expecting to have the final burner test report anytime

now and I will forward to you then.

Regards,

Andrew Chew

Project Manager

Applications Engineering

Air Monitor Corporation

Tel.: 707-521-1709

Fax: 707-526-2825

Email: achew@airmonitor.com

From: Jerry Finlinson
To: Jon Christensen
Date: 2/9/2006 8:05 AM
Subject: Fwd: RE: IPSC U2 IBAM tubing repair recommendation wanted

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
Eat no more than you expend in energy

>>> Jerry Finlinson 2/9/2006 7:20:44 AM >>>
FYI,

Here's the feedback I got from Air Monitor regarding the U2 burner IBAM tubing weld repair. They recommend that heliarc welding be done for maximum durability.

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
Eat no more than you expend in energy

>>> "Matt Maragos" <mmaragos@airmonitor.com> 2/8/2006 1:07:42 PM >>>
Jerry,

We have IBAM customers that have Heli-arc welded the interconnect fittings and those that have used compression fittings (Swagelok). Either can be completely reliable, but the Heli-arc welding would provide the most assurance over the long haul and is the preference for us and the majority of our customers.

A few customers have chosen compression fittings because they either did not want to weld or wanted to be able to remove and inspect/replace the IBAMs easily. We do not see a need to inspect the IBAMs and typically they only require replacement when something dramatic has happened to the burner (which would necessitate significant or wholesale repair to other burner items).

Your method for Heli-arc welding the existing installations sounds reasonable. Andy and I discussed briefly and we (he) may have some ideas to make the job a little easier.

The most critical item (you already know this and I sound like Captain Obvious) is performing leak checks prior to the Unit coming back online.

IP7_026361

If you do go the route of compression fittings, expect as many as 50-75% of them to leak upon initial installation (we have seen this with other customers). That installation process will involve going back to re-torque the fittings and eliminate the leaks.

We're here to help.

Please let us know if you have any questions or concerns.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Tuesday, January 31, 2006 2:16 PM

To: achew@airmonitor.com; mmaragos@airmonitor.com; pdave@airmonitor.com; <Ken Hall; dearley@nc.rr.com

Cc: sal@advancedburner.com; Aaron Nissen; Bill Morgan; Dean Wood; Garry Christensen; Jim Knapp; Will Lovell

Subject: IPSC U2 IBAM tubing repair recommendation wanted

Air Monitor,

We have had significant problems with our IBAM tubing that was silver brazed on the ABT burners 2 years ago. On our last short outage I got inside one windbox and found several broken and leaky fittings. I didn't have time to check them all. We fixed what we could, but we can't trust the data.

We'd like to get in this upcoming major outage in April and fix it better with heliarc welding. Our welder didn't think it would be too easy to clear off the old silver brazing in preparation for heliarc welding. They propose two options:

- 1) Replace the crosses and couplers with swageloc compression fittings. These would be easiest to install. Do you have experience with compression fittings? Would they likely loosen and leak?
- 2) Replace them with heliarc welded crosses and couplers, but place an additional coupler about 1.5 inches out on each leg of the cross to get to a cleaner tubing area. This would be adding 8 additional couplers to the system. We could preweld the cross and couplers in the shop, so they would be good welds.

We'd like your improved recommendation. What do other plants do for a

IP7_026362

robust installation?

We like the heli arc welding on the latest ABT burner tubing. (see attached photos)

Thanks, Jerry

7/27/05

Jerry,

After reviewing the photos and looking further into our fabricator's (PCW)

silver brazing application, I do not see any reason that the silver brazed

joints would be failing over time due to the 700 degree secondary air temperature. This is well below the temperature rating of the brazing material used (PCW used J.W. Harris "Safety-Silv 50N" applied with "Stay-Silv Flux-black") which has a Solidus-Liquidus range of 1220-1305 deg

F. Reference attached "Braze/Solder Product List" which indicates that this

is the correct application for stainless and temperatures.

The only other reasons I can think of that could cause the brazed joints to

fail is either damage by handling during the installation of the burner in

the windbox, or due to secondary air flyash chemistry corroding joints. Since the weld repaired joints seem to be holding up, and not knowing the

flyash chemistry at this point, I would recommend repairing leaks in the future with Heliarc method IPSC used to make original repairs.

Note that we will also use Heliarc to make the IBAM tube/fitting welds on

the replacement burner for IPSC PO No. 06-48595. Also if you could let me

know the chemistry of the ash in secondary air, I would be happy to follow-up with J.W. Harris to see if this could possibly cause corrosion of

the brazed joints.

Regards,

Sal

IP7_026363

-----Original Message-----

From: Sal Ferrara [mailto:sal@advancedburner.com]
Sent: Wednesday, June 01, 2005 11:15 AM
To: Jerry Finlinson
Subject: RE: IPSC U2 Burner IBAM silver brazing failure

Jerry,
I don't mean to keep you hanging. I am looking into this and will respond back with our recommendation as soon as possible.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, May 26, 2005 10:18 AM
To: sal@advancedburner.com; tarkel@advancedburner.com; mmaragos@airmonitor.com; khpqup@earthlink.net
Cc: Aaron Nissen; Bill Morgan; Garry Christensen; Howard Scott; Jerry Finlinson; Jim Knapp; John Fritzges; Jon Christensen; Ken Nielson; Nathan
Crop; Pam Bahr
Subject: IPSC U2 Burner IBAM silver brazing failure

FYI,
During our Feb05 unit 2 outage I went in to inspect the D1 burner which had a bad IBAM signal. At that time we found 2 broken manifold pipes. They were weld repaired, but the signal was still bad. So this week during our tube leak outage, I went in to inspect and found those weld repairs still good, but there were 6 other leaky fittings in the stainless steel couplings and T's. This was originally silver brazed by Advanced Burner at their manufacturing shop. We found many leaks upon delivery and they were rebrazed on site.

Now we find that apparently that brazing material is not holding up to the 700 F temp in the secondary air windboxes and new leaks are developing. PCW's assurances that the joints were all good and will not leak has proven to be incorrect. So we need to remedy the situation. We'll need to plan a major project to go in on the next major outage and do a proper weld on all those fittings. What type of weld would you advise? Heliarc?

IP7_026364

Do you provide warranty coverage for this type of failure?

Please advise.

Below is some emails that we exchanged on the original problem in Feb 2004.

At that time we were advised by ABT that silver brazing would be able to withstand temps up to 1100 F. Notice in the enclosed photos that the brazing appears to be flaking off on the outside. Also when our guys do a weld on one side of the fitting then the brazing melts out on the otherside, so they must do it all the way around.

Jerry

Jerry,

I am sure you will let us know what ABT proposes to remedy the tubing joint leaks.

Thanks.

Andy

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]

Sent: Thursday, February 05, 2004 5:46 PM

To: sal@advancedburner.com; Bill Morgan; Howard Hamilton; James Nelson; Ken Nielson; Phil Hailes

Cc: Andy Chew; Matt Maragos; khppquip@earthlink.net

Subject: ABT burner pitot manifold leak photos - AMC WO NO 50633

FYI,

Today I observed TEI Jon McCarra doing a leak check on the ABT burner

pitot manifold silver brazing welds.

Each manifold has 11 joints on the total pressure (TP) and 11 joints on the

static pressure (SP).

2 on each side of the 3 pitot couplings, 4 on each side of the cross and

IP7_026365

a

pipe to tubing joint.

I have enclosed representative photos of the leak check soap bubbles showing leaks, some leaks were small, a couple were very large.

Here's a list of the leaks we found on the 9 burners staged on the rear of the boiler.

7th floor

CW6 - SP, 1 leak on coupling to pitot

CW3 - TP = 3 leaks, pipe to tubing, top leg of cross, 11:00 pitot coupling

CW14 2 leaks, SP = bottom 6:00 coupling, TP = bottom 6:00 coupling

6th floor

CW8 - 1 leak, TP - top of cross

CW4 - 2 leaks, SP tube to pipe, and 11:00 coupling,

CW5 - 8 leaks, SP - 3 sides of cross, top 11:00 coupling, TP = 2 sides of

cross, bottom 6:00 coupling

5th floor

All three burners had no leaks, they appeared to be better welded.

As a percent of burners, 66% of the burners had leaks in the manifold.

As a percent of joints from the total of $9 \times 22 = 198$ joints, $17/198 = 8.5\%$ of joints.

What weld repair remedy would you suggest?

We will check the burners on the boiler front tomorrow.

Thanks, Jerry

Jerry Finlinson, Engineer

Intermountain Power Service Corp

850 West Brush Wellman Rd

Delta, UT 84624

435-864-6466 fax 0776/6670

jerry-f@ipsc.com

Jerry Finlinson, Engineer

Intermountain Power Service Corp

850 West Brush Wellman Rd

Delta, UT 84624

435-864-6466 fax 0776/6670

jerry-f@ipsc.com

Jerry Finlinson, Control Engineer

Intermountain Power Service Corp

IP7_026366

850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

A truly happy person is one who can enjoy the scenery on a detour.

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/4/2004 8:38:38 AM >>>

Jerry,

The tube joints are joined by silver brazing since the soldering process has too low of a temperature rating for our purpose. Andy Chew has it backwards in his response to you. Silver soldering is rated for a working temperature in the 400 to 500°F range. Silver brazing is typically rated upwards of 1100°F working temperature range. Concerning the appearance of the brazed joints, PCW did not clean all the joints in which case you see some of the flux material used in the brazing process. PCW has assured us that the joints are good and will not leak.

Let me know if you have other questions.

Regards,

Sal

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]

Sent: Tuesday, February 03, 2004 8:17 PM

To: Howard Hamilton; James Nelson; Phil Hailes

Cc: sal@advancedburner.com

Subject: Fwd: RE: ABT burner pitot photos - AMC WO NO 50633

FYI,

Here's Air Monitor's response to the photos of the IBAM manifold welding.

Hopefully, they did use silver solder, not brazing.

Sal, please advise.

Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> Andy Chew <achew@airmonitor.com> 2/3/2004 4:34:23 PM >>>

Jerry,

Air Monitor agreed to ABT's suggestion of using a sealing method other than

Heliarc welding. Originally they mentioned brazing but we insisted on silver solder because the temperature rating of the silver solder joint is

much higher than that of brazing. You should ask ABT about this but it appears they did not clean the solder joints. They may be good joints

IP7_026367

and
just not look very pretty. You want to make sure they are pressure
tested
before going into service. When we modified the probes we only added
additional Total pressure sensor holes to the production manifolds.
Additional Static pressure sensor holes were determined to be not
necessary
as they did not improve the performance accuracy of the device. We
will be
providing an as built drawing which will include the pressure sensor
details. Again, I am expecting to have the final burner test report
anytime
now and I will forward to you then.

Regards,

Andrew Chew
Project Manager
Applications Engineering
Air Monitor Corporation
Tel.: 707-521-1709
Fax: 707-526-2825
Email: achew@airmonitor.com

From: Jerry Finlinson
Start: 2/10/2006
Due: 1/31/2006
Subject: Will Lovell requests more input on IBAM tubing repair.

From: Jerry Finlinson
To: Ron Taylor
CC: Dean Wood; Garry Christensen; Howard Scott; Jim Knapp; Ralph Newberr...
Date: 3/2/2006 3:39 PM
Subject: Burner IBAM tubing fittings for weld repair

Ron,

For the U2 IBAM burner air flow measurement we plan to do a TIG weld repair under work order 06-88366. We need to order 316 stainless tubing fittings.

100 ft of ½ inch (0.500") stainless tubing with 0.065 inch wall thickness, 10 sticks x 10 ft

½ inch tubing 316 stainless crosses 2 x 48 + 4 spare = 100 each

½ inch tubing 316 stainless couplers, 16*48 = 768 each

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

IP7_026370

From: Ralph Newberry
To: Finlinson, Jerry
CC: Taylor, Ron
Date: 3/2/2006 3:53 PM
Subject: Re: Burner IBAM tubing fittings for weld repair

Thought you said it would not be weird.....that is referred to as a Sch 5, the lightest weight you can get in 1/2" -.840 od x .065 w x .710 ins dia x .5383 lbs per ft. and that equals a 5S.

ralph

From: Jerry Finlinson
To: Ralph Newberry
Date: 3/2/2006 4:00 PM
Subject: Re: Burner IBAM tubing fittings for weld repair

The outside diameter is 0.500 inches x .065 w = 0.37 inch id.
Please check again.
Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
Always put a cute quote or sage advise at the end of your emails.

>>> Ralph Newberry 3/2/2006 3:53:49 PM >>>

Thought you said it would not be weird.....that is referred to as a Sch 5, the lightest weight you can get in 1/2" -.840 od x .065 w x .710 ins dia x .5383 lbs per ft. and that equals a 5S.

ralph

From: Ralph Newberry
To: Finlinson, Jerry
Date: 3/2/2006 4:07 PM
Subject: Re: Burner IBAM tubing fittings for weld repair

ss tubing at 1/2" has a 'working decimal equivalent' of .500". Is that what you are referencing?

>>> Jerry Finlinson 3/2/06 4:00:58 PM >>>

The outside diameter is 0.500 inches x .065 w = 0.37 inch id.

Please check again.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

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>>> Ralph Newberry 3/2/2006 3:53:49 PM >>>

Thought you said it would not be weird.....that is referred to as a Sch 5, the lightest weight you can get in 1/2" -.840 od x .065 w x .710 ins dia x .5383 lbs per ft. and that equals a 5S.

ralph

IP7_026373

From: Jerry Finlinson
To: Ralph Newberry
Date: 3/2/2006 5:06 PM
Subject: Re: Burner IBAM tubing fittings for weld repair

Yes, but your note below says 0.084 inch od and 0.710 inch id, so that is very different.
Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
Always put a cute quote or sage advise at the end of your emails.

>>> Ralph Newberry 3/2/2006 4:07:46 PM >>>
ss tubing at 1/2" has a 'working decimal equivalent' of .500". Is that what you are referencing?

>>> Jerry Finlinson 3/2/06 4:00:58 PM >>>
The outside diameter is 0.500 inches x .065 w = 0.37 inch id.
Please check again.
Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
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>>> Ralph Newberry 3/2/2006 3:53:49 PM >>>
Thought you said it would not be weird.....that is referred to as a Sch 5, the lightest weight you can get
in 1/2" -.840 od x .065 w x .710 ins dia x .5383 lbs per ft. and that equals a 5S.

ralph

From: Ralph Newberry
To: Finlinson, Jerry
Date: 3/3/2006 7:04 AM
Subject: Re: Burner IBAM tubing fittings for weld repair

Yes and that is how it is listed in the reference book that I was using but then another one list it the way you have it.....who knows! You do the req and I'll try to find it.

Ralph

>>> Jerry Finlinson 3/2/06 5:06:11 PM >>>

Yes, but your note below says 0.084 inch od and 0.710 inch id, so that is very different.
Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

>>> Ralph Newberry 3/2/2006 4:07:46 PM >>>

ss tubing at 1/2" has a 'working decimal equivalent' of .500". Is that what you are referencing?

>>> Jerry Finlinson 3/2/06 4:00:58 PM >>>

The outside diameter is 0.500 inches x .065 w = 0.37 inch id.
Please check again.
Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

>>> Ralph Newberry 3/2/2006 3:53:49 PM >>>

Thought you said it would not be weird.....that is referred to as a Sch 5, the lightest weight you can get in 1/2" -.840 od x .065 w x .710 ins dia x .5383 lbs per ft. and that equals a 5S.

ralph

IP7_026375

From: Jim Knapp
To: Jerry Finlinson; Ron Taylor
Date: 3/7/2006 7:22 AM
Subject: Fwd: Fw: Order Acknowledgement - Quote Order for Order #:137552-00
Attachments: e7a967f5-5ce2-4e29-b15f-3f8507126893.pdf

Here is the fitting order.

>>> <RWhetman@FlowSolutions.com> 3/6/2006 4:17:54 PM >>>
Hello Jim,

As requested here's the quote for the fittings.
Regards,

Roger Whetman
Flow Solutions, Intermountain Division
866-232-2409 Direct
801-565-8087 FAX
rwhetman@flowsolutions.com
www.flowsolutions.com

(See attached file: e7a967f5-5ce2-4e29-b15f-3f8507126893.pdf)

IP7_026376

FLOW SOLUTIONS

QUOTE

CORRESPONDENCE TO

Flow Solutions Inc / Utah Div.
801-565-9600 fax 801-565-8087
1440 West 8120 South
West Jordan, UT 84088

QUOTE DATE	QUOTE NO
03/06/06	137552-00
RFQ NO	TERMS
RFQ JIM KNAPP	Net 30

SHIP TO

INTERMOUNTAIN POWER SERVI
850 W. BRUSH WELLMAN ROAD
HWY 6
DELTA, UT 84624

LINE NO	PRODUCT AND DESCRIPTION	QUANTITY ORDERED	QTY U/M	UNIT PRICE	AMOUNT (NET)
1	ISST8TSUC TRUFIT UNION CROSS 200 STOCK BALANCE 5 WEEKS *****	768	each	24.32	18677.76
2	ISST8TSU TRUFIT UNION 10 EA FACTORY STOCK *****	100	each	4.61	461.00
2	Lines Total	Qty Shipped Total	868	Total Taxes Invoice Total	19138.76 1100.48 20239.24
Last Page					
TERMS AND CONDITIONS ATTACHED					

IP7_026377

TERMS AND CONDITIONS OF SALE

1. GENERAL: The terms and conditions of sale contained herein apply to all quotations made and purchase orders entered into by Seller. Acceptance of buyer's order is made only on the express understanding and condition that insofar as the terms and conditions of this acceptance conflict with any terms and conditions of buyer's order, the terms and conditions of this acceptance shall govern, irrespective of whether buyer accepts these conditions by a written acknowledgement, by implication, or by acceptance of and payment for goods ordered hereunder. Seller's failure to object to provisions contained in any communication from Buyer shall not be deemed a waiver of the provisions of this acceptance. Any changes in the terms and conditions of sale contained herein must specifically be agreed to in writing by a corporate officer of Seller before becoming binding on either Seller or Buyer.

Any orders or contracts must be approved and accepted by seller at its home office at 1725 Rutan Drive, Livermore, CA 94551. The said terms and conditions of sale shall be applicable whether or not they are attached to or enclosed with the products to be sold or sold hereunder.

2. PRICES: Irrespective of any prices quoted by Seller or listed on buyer's order, an order is accepted only at the prices shown on Seller's acknowledgement. Price quoted for the items described on said acknowledgement are firm and not subject to audit or price redetermination. Prices are subject to revision when interruptions, or changes in the quality are caused or requested by Buyer.

3. TAXES: All prices quoted by Seller or listed on buyer's order, an order is accepted only at the prices shown on Seller's acknowledgement. Prices quoted for addition to the prices specified herein, the amount of any present or future excise, sales, use or similar tax applicable to the sale of the product hereunder shall be paid by Buyer, or in lieu thereof Buyer shall provide Seller with a tax exemption certificate, acceptable to the taxing authorities. Such taxes, when applicable, will appear as separate additional items on the invoice unless Seller receives a proper tax exemption certificate from Buyer prior to shipment.

4. TERMS AND METHODS OF PAYMENT: Where Seller has extended credit to buyer, terms of payment shall be net thirty (30) days from date of invoice. No discounts are authorized. The amount of credit may be changed or credit withdrawn by Seller at any time. On any order on which credit is not extended by supplier, shipment or delivery shall be made at Seller's election. Cash with order (in whole or in part) C O D or sight draft attached to bill of lading or other shipping documents, with all costs of collection for the account of Buyer.

If, in the judgment of Seller, the financial condition of buyer at any time does not justify continuation of shipment on the terms of payment originally specified, Seller may require full or partial payment in advance, and, in the event of the bankruptcy or insolvency of Buyer or in the event any proceeding is brought by or against Buyer under bankruptcy or insolvency laws, Seller shall be entitled to cancel any order then outstanding and shall receive reimbursement for its cancellation charges.

Each shipment shall be considered a separate independent transaction, and payment therefore shall be made accordingly. If shipments are delayed by Buyer, payments shall become due on the date, which Seller is prepared to make shipment. If the work covered by the purchase order is delayed by buyer, payments shall be made based on the purchase price and the percentage of completion. Products held for Buyer shall be at the risk and expense of Buyer. Seller reserves the right to ship to its order and make collection by sight draft with bill of lading attached.

5. TITLE AND DELIVERY: All sales are made F O B point of manufacture. Seller's title passes to Buyer and Seller's liability as to delivery ceases upon making delivery of material purchased hereunder to carrier at shipping point in good condition. The carrier is to be regarded as Buyer's agent. All claims for damages must be filed with the carrier.

All shipments will normally be made by Parcel Post, Air Express or Air Freight. Unless specific instructions from Buyer specify which of the foregoing methods of shipment is to be used, Seller will exercise its own discretion.

Shipping dates are approximate and are based upon prompt receipt from buyer of all necessary information.

Seller shall not be responsible for any failure to perform arising from causes beyond its control. These causes shall include but not be restricted to fire, storm, flood, earthquake, explosion, accident, riot, war, rebellion, insurrection, sabotage, epidemic, quarantine restrictions, labor dispute, labor shortages, transportation embargoes, or failure or delays in transportation, inability to secure raw materials or machinery for the manufacture of its products, acts of God, acts of federal Government or any agency thereof, acts of any state or local government or agency thereof, and judicial action. In the event of any such delay, date of delivery shall, at the request of Seller, be deferred for a period equal to the time lost by reason of delay.

In event of any default by Buyer, Seller may decline to make further shipment without in any way affecting its rights under such order. If, despite any default by Buyer, Seller elects to continue to make shipments, its action shall not constitute a waiver of any default by Buyer or in any way affect Seller's legal remedies of any such default. Right of possession of the products sold hereunder shall remain with Seller and such products shall remain personal property until all payments hereunder (including deferred payments, whether evidenced by notes or otherwise) shall have been made in full in each, and buyer agrees to do all acts necessary to perfect and maintain such right and title in Seller.

6. ATTORNEYS FEES: If either party shall bring any action for relief against the other, declaratory or otherwise, arising out of this contract, the losing party shall pay the prevailing party reasonable attorney's fees incurred in bringing such suit and/or enforcing any judgment granted therein and shall be paid whether or not such action is prosecuted to judgment.

7. WARRANTY. SELLER WARRANTS TO BUYER THAT PRODUCTS SOLD TO BUYER PURSUANT TO THIS AGREEMENT SHALL MEET THE MUTUALLY AGREED UPON SPECIFICATIONS FOR A PERIOD OF THIRTY (30) DAYS FOLLOWING THE DATE OF SHIPMENT TO BUYER.

THE FORGOING IS IN LIEU OF ANY OTHER WARRANTY, EXPRESS, IMPLIED OR STATUTORY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTY ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE, ALL OF WHICH OTHER WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED.

THE LIABILITY OF SELLER UNDER THIS WARRANTY IS LIMITED SOLELY TO REPLACING, OR REPAIRING, OR ISSUING CREDIT (AT THE DISCRETION OF SELLER) FOR SUCH PRODUCTS THAT FAIL TO MEET THE SPECIFICATIONS DURING THE WARRANTY PERIOD, PROVIDED THAT SELLER WILL NOT BE LIABLE UNDER THIS WARRANTY UNLESS (I) SELLER IS PROMPTLY NOTIFIED IN WRITING BY BUYER UPON DISCOVERY OF ANY SUCH FAILURE TO MEET THE SPECIFICATIONS, (II) THE DEFECTIVE PRODUCTS ARE RETURNED TO SELLER, TRANSPORTATION CHARGES PREPAID BY BUYER, (III) THE DEFECTIVE PRODUCTS ARE RECEIVED BY SELLER FOR ADJUSTMENT NO LATER THAN TWO (2) WEEKS FOLLOWING THE LAST DAY OF THE WARRANTY PERIOD, AND (IV) SELLER'S EXAMINATION OF SUCH PRODUCTS SHALL DISCLOSE, TO ITS OWN SATISFACTION, THAT SUCH FAILURES DID NOT ARISE AS A RESULT OF MISUSE, ABUSE, IMPROPER INSTALLATION OR APPLICATION, REPAIR, ALTERATION, OR ACCIDENT, OR NEGLIGENCE IN USE, STORAGE, TRANSPORTATION OR HANDLING BY OTHER THAN SELLER, ANY AUTHORIZATION FOR REPAIRS OR ALTERATIONS MUST BE IN WRITING TO PREVENT VOIDING SELLER'S WARRANTY.

NOTHING HEREIN SHALL BE CONSTRUED AS PASSING OR INTENDING TO PASS SELLER'S WARRANTY TO BUYER DIRECTLY ON TO ANY CUSTOMER(S) OF BUYER, IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR LOSS OF PROFITS, LOSS OF USE, OR DAMAGES OF ANY KIND BASED UPON A CLAIM FOR BREACH OF WARRANTY.

8. LIMITATION OF LIABILITY: IN THE EVENT OF A BREACH OF THIS AGREEMENT OR OF ANY TERM OR CONDITION HEREOF, THE DEFAULTING PARTY SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES OR LOSS OF PROFITS OR GOODWILL.

9. PRODUCT RETURNS: Products may not be returned for any reason without prior written authorization and shipping instructions from Flow Solutions. Products shipped without Flow Solutions' authorization may be returned to buyer at buyer's expense. Credit for any returned products is at the discretion of Flow Solutions and may be based on the applicable manufacturer's return policy. Restocking and/or handling charges will apply to all returns.

From: Jerry Finlinson
To: Jim Knapp
CC: Ralph Newberry; Ron Taylor; RWhetman@FlowSolutions.com
Date: 3/7/2006 8:00 AM
Subject: Re: Order Acknowledgement - Quote Order for Order #:137552-00

Jim,

He's got the numbers backwards, we wanted 100 crosses and 768 unions.
So that would lower the price to \$5972, which is more reasonable.

Roger, could you update the quote. These are for ½ inch diameter tubing correct?
We also wanted 100 ft of ½ inch diameter stainless tubing. 0.065 wall thickness.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

>>> Jim Knapp 3/7/2006 7:22:13 AM >>>
Here is the fitting order.

>>> <RWhetman@FlowSolutions.com> 3/6/2006 4:17:54 PM >>>
Hello Jim,

As requested here's the quote for the fittings.
Regards,

Roger Whetman
Flow Solutions, Intermountain Division
866-232-2409 Direct
801-565-8087 FAX
rwhetman@flowsolutions.com
www.flowsolutions.com

(See attached file: e7a967f5-5ce2-4e29-b15f-3f8507126893.pdf)

IP7_026379

From: <RWhetman@FlowSolutions.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Jim Knapp" <JIM-KNAPP@ipsc.com>, "Ralph Newberry" <RALPH-N@ipsc.com>, "...
Date: 3/7/2006 12:41 PM
Subject: Re: Order Acknowledgement - Quote Order for Order #:137552-00

I just sent it to Jim with the tubing.

Regards,

Roger Whetman
Flow Solutions, Intermountain Division
866-232-2409 Direct
801-565-8087 FAX
rwhetman@flowsolutions.com
www.flowsolutions.com

"Jerry Finlinson"
<Jerry-F@ipsc.com>
>
To
"Jim Knapp" <JIM-KNAPP@ipsc.com>
03/07/2006 07:00 AM cc
<RWhetman@FlowSolutions.com>,
"Ralph Newberry"
<RALPH-N@ipsc.com>, "Ron Taylor"
<RON-T@ipsc.com>
Subject
Re: Order Acknowledgement - Quote
Order for Order #:137552-00

Jim,

He's got the numbers backwards, we wanted 100 crosses and 768 unions.
So that would lower the price to \$5972, which is more reasonable.

Roger, could you update the quote. These are for ½ inch diameter tubing
correct?

We also wanted 100 ft of ½ inch diameter stainless tubing. 0.065 wall
thickness.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd

IP7_026380

Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

>>> Jim Knapp 3/7/2006 7:22:13 AM >>>

Here is the fitting order.

>>> <RWhetman@FlowSolutions.com> 3/6/2006 4:17:54 PM >>>

Hello Jim,

As requested here's the quote for the fittings.

Regards,

Roger Whetman
Flow Solutions, Intermountain Division
866-232-2409 Direct
801-565-8087 FAX
rwhetman@flowsolutions.com
www.flowsolutions.com

(See attached file: e7a967f5-5ce2-4e29-b15f-3f8507126893.pdf)

IP7_026381

From: Jim Knapp
To: Jerry Finlinson; Ralph Newberry
Date: 3/7/2006 12:50 PM
Subject: Fwd: fitting & tubing Quote #:137552-00
Attachments: 83877714-b6cb-49a3-9ac7-226fd4863af1.pdf

He still hasn't got it quite correct. But I think you can tell what the prices are. I'm sure they don't have 200 crosses on hand.

>>> <RWhetman@FlowSolutions.com> 3/7/2006 12:11:40 PM >>>
Regards,

Roger Whetman
Flow Solutions, Intermountain Division
866-232-2409 Direct
801-565-8087 FAX
rwhetman@flowsolutions.com
www.flowsolutions.com

(See attached file: 83877714-b6cb-49a3-9ac7-226fd4863af1.pdf)

FLOW SOLUTIONS**QUOTE**

CORRESPONDENCE TO

Flow Solutions Inc / Utah Div.
801-565-9600 fax 801-565-8087
1440 West 8120 South
West Jordan, UT 84088

QUOTE DATE	QUOTE NO
03/06/06	137552-00
RFQ NO	TERMS
RFQ JIM KNAPP	Net 30

SHIP TO

INTERMOUNTAIN POWER SERVI
850 W. BRUSH WELLMAN ROAD
HWY 6
DELTA, UT 84624

LINE NO	PRODUCT AND DESCRIPTION	QUANTITY ORDERED	QTY U/M	UNIT PRICE	AMOUNT (NET)
1	ISST8TSUC TRUFIT UNION CROSS 200 STOCK BALANCE 5 WEEKS *****	100	each	24.32	2432.00
2	ISST8TSU TRUFIT UNION 10 EA FACTORY STOCK *****	768	each	4.61	3540.48
3	TUBING 1/2' X .065' 316 SMLSS ASTM A269 ASME SA213, BRIGHT ANNEAL STOCK, W. JORDAN, UT	100	each	3.00	300.00
3	Lines Total	Qty Shipped Total	968	Total Taxes Invoice Total	6272.48 360.66 6633.14
Last Page					
TERMS AND CONDITIONS ATTACHED					

IP7_026383

TERMS AND CONDITIONS OF SALE

1. GENERAL: The terms and conditions of sale contained herein apply to all quotations made and purchase orders entered into by Seller. Acceptance of buyer's order is made only on the express understanding and condition that insofar as the terms and conditions of this acceptance conflict with any terms and conditions of buyer's order, the terms and conditions of this acceptance shall govern, irrespective of whether buyer accepts these conditions by a written acknowledgement, by implication, or by acceptance of and payment for goods ordered hereunder. Seller's failure to object to provisions contained in any communication from Buyer shall not be deemed a waiver of the provisions of this acceptance. Any changes in the terms and conditions of sale contained herein must specifically be agreed to in writing by a corporate officer of Seller before becoming binding on either Seller or Buyer.

Any orders or contracts must be approved and accepted by seller at its home office at 1725 Rutan Drive, Livermore, CA 94551. The said terms and conditions of sale shall be applicable whether or not they are attached to or enclosed with the products to be sold or sold hereunder.

2. PRICES: Irrespective of any prices quoted by Seller or listed on buyer's order, an order is accepted only at the prices shown on Seller's acknowledgement. Price quoted for the items described on said acknowledgement are firm and not subject to audit or price redetermination. Prices are subject to revision when interruptions, or changes in the quality are caused or requested by Buyer.

3. TAXES: All prices quoted by Seller or listed on buyer's order, an order is accepted only at the prices shown on Seller's acknowledgement. Prices quoted for addition to the prices specified herein, the amount of any present or future excise, sales, use or similar tax applicable to the sale of the product hereunder shall be paid by Buyer, or in lieu thereof Buyer shall provide Seller with a tax exemption certificate, acceptable to the taxing authorities. Such taxes, when applicable, will appear as separate additional items on the invoice unless Seller receives a proper tax exemption certificate from Buyer prior to shipment.

4. TERMS AND METHODS OF PAYMENT: Where Seller has extended credit to buyer, terms of payment shall be net thirty (30) days from date of invoice. No discounts are authorized. The amount of credit may be changed or credit withdrawn by Seller at any time. On any order on which credit is not extended by supplier, shipment or delivery shall be made at Seller's election. Cash with order (in whole or in part), C.O.D. or sight draft attached to bill of lading or other shipping documents, with all costs of collection for the account of Buyer.

If, in the judgment of Seller, the financial condition of buyer at any time does not justify continuation of shipment on the terms of payment originally specified, Seller may require full or partial payment in advance, and, in the event of the bankruptcy or insolvency of Buyer or in the event any proceeding is brought by or against Buyer under bankruptcy or insolvency laws, Seller shall be entitled to cancel any order then outstanding and shall receive reimbursement for its cancellation charges.

Each shipment shall be considered a separate independent transaction, and payment therefore shall be made accordingly. If shipments are delayed by Buyer, payments shall become due on the date, which Seller is prepared to make shipment. If the work covered by the purchase order is delayed by buyer, payments shall be made based on the purchase price and the percentage of completion. Products held for Buyer shall be at the risk and expense of Buyer. Seller reserves the right to ship to its order and make collection by sight draft with bill of lading attached.

5. TITLE AND DELIVERY: All sales are made F.O.B. point of manufacture. Seller's title passes to Buyer and Seller's liability as to delivery cease upon making delivery of material purchased hereunder to carrier at shipping point in good condition. The carrier is to be regarded as Buyer's agent. All claims for damages must be filed with the carrier.

All shipments will normally be made by Parcel Post, Air Express or Air Freight. Unless specific instructions from Buyer specify which of the foregoing methods of shipment is to be used, Seller will exercise its own discretion.

Shipping dates are approximate and are based upon prompt receipt from buyer of all necessary information.

Seller shall not be responsible for any failure to perform arising from causes beyond its control. These causes shall include but not be restricted to fire, storm, flood, earthquake, explosion, accident, riot, war, rebellion, insurrection, sabotage, epidemic, quarantine restrictions, labor dispute, labor shortages, transportation embargoes, or failure or delays in transportation, inability to secure raw materials or machinery for the manufacture of its products, acts of God, acts of federal Government or any agency thereof, acts of any state or local government or agency thereof, and judicial action. In the event of any such delay, date of delivery shall, at the request of Seller, be deferred for a period equal to the time lost by reason of delay.

In event of any default by Buyer, Seller may decline to make further shipment without in any way affecting its rights under such order. If, despite any default by Buyer, Seller elects to continue to make shipments, its action shall not constitute a waiver of any default by Buyer or in any way affect Seller's legal remedies of any such default. Right of possession of the products sold hereunder shall remain with Seller and such products shall remain personal property until all payments hereunder (including deferred payments, notes or otherwise) shall have been made in full in each, and buyer agrees to do all acts necessary to perfect and maintain such right and title in Seller, whether evidenced by

6. ATTORNEYS FEES: If either party shall bring any action for relief against the other, declaratory or otherwise, arising out of this contract, the losing party shall pay the prevailing party reasonable attorney's fees incurred in bringing such suit and/or enforcing any judgment granted therein and shall be paid whether or not such action is prosecuted to judgment.

7. WARRANTY. SELLER WARRANTS TO BUYER THAT PRODUCTS SOLD TO BUYER PURSUANT TO THIS AGREEMENT SHALL MEET THE MUTUALLY AGREED UPON SPECIFICATIONS FOR A PERIOD OF THIRTY (30) DAYS FOLLOWING THE DATE OF SHIPMENT TO BUYER.

THE FOREGOING IS IN LIEU OF ANY OTHER WARRANTY, EXPRESS, IMPLIED OR STATUTORY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTY ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE, ALL OF WHICH OTHER WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED.

THE LIABILITY OF SELLER UNDER THIS WARRANTY IS LIMITED SOLELY TO REPLACING, OR REPAIRING, OR ISSUING CREDIT (AT THE DISCRETION OF SELLER) FOR SUCH PRODUCTS THAT FAIL TO MEET THE SPECIFICATIONS DURING THE WARRANTY PERIOD, PROVIDED THAT SELLER WILL NOT BE LIABLE UNDER THIS WARRANTY UNLESS (I) SELLER IS PROMPTLY NOTIFIED IN WRITING BY BUYER UPON DISCOVERY OF ANY SUCH FAILURE TO MEET THE SPECIFICATIONS, (II) THE DEFECTIVE PRODUCTS ARE RETURNED TO SELLER, TRANSPORTATION CHARGES PREPAID BY BUYER, (III) THE DEFECTIVE PRODUCTS ARE RECEIVED BY SELLER FOR ADJUSTMENT NO LATER THAN TWO (2) WEEKS FOLLOWING THE LAST DAY OF THE WARRANTY PERIOD, AND (IV) SELLER'S EXAMINATION OF SUCH PRODUCTS SHALL DISCLOSE, TO ITS OWN SATISFACTION, THAT SUCH FAILURES DID NOT ARISE AS A RESULT OF MISUSE, ABUSE, IMPROPER INSTALLATION OR APPLICATION, REPAIR, ALTERATION, OR ACCIDENT, OR NEGLIGENCE IN USE, STORAGE, TRANSPORTATION OR HANDLING BY OTHER THAN SELLER, ANY AUTHORIZATION FOR REPAIRS OR ALTERATIONS MUST BE IN WRITING TO PREVENT VOIDING SELLER'S WARRANTY.

NOTHING HEREIN SHALL BE CONSTRUED AS PASSING OR INTENDING TO PASS SELLER'S WARRANTY TO BUYER DIRECTLY ON TO ANY CUSTOMER(S) OF BUYER, IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR LOSS OF PROFITS, LOSS OF USE, OR DAMAGES OF ANY KIND BASED UPON A CLAIM FOR BREACH OF WARRANTY.

8. LIMITATION OF LIABILITY: IN THE EVENT OF A BREACH OF THIS AGREEMENT OR OF ANY TERM OR CONDITION HEREOF, THE DEFAULTING PARTY SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES OR LOSS OF PROFITS OR GOODWILL.

9. PRODUCT RETURNS: Products may not be returned for any reason without prior written authorization and shipping instructions from Flow Solutions. Products shipped without Flow Solutions' authorization may be returned to buyer at buyer's expense. Credit for any returned products is at the discretion of Flow Solutions and may be based on the applicable manufacturer's return policy. Restocking and/or handling charges will apply to all returns.

IP7_026384

From: Ron Taylor
To: Jim Knapp; Will Lovell
CC: Jerry Finlinson; Kelly Cloward; Mike Alley; Ralph Newberry
Date: 3/7/2006 1:41 PM
Subject: Re: Fwd: fitting & tubing Quote #:137552-00

Jim,

I just put in the Req. for these fittings and tubing..... Thought you would like to know.

WO# 06-88366-0 Direct Req.# 223064

Ron T.

>>> Jim Knapp 3/7/2006 12:15:05 PM >>>
Here is the real quote for fittings and tubing.

>>> <RWhetman@FlowSolutions.com> 3/7/2006 12:11:40 PM >>>
Regards,

Roger Whetman
Flow Solutions, Intermountain Division
866-232-2409 Direct
801-565-8087 FAX
rwhetman@flowsolutions.com
www.flowsolutions.com

(See attached file: 83877714-b6cb-49a3-9ac7-226fd4863af1.pdf)

IP7_026385

From: Jerry Finlinson
To: Aaron Nissen; Dean Wood; Garry Christensen; Jim Knapp; John Fritzges
CC: Bill Morgan; Jon Christensen; Ken Nielson
Date: 3/15/2006 6:00 PM
Subject: Fwd: Intermountain - Thermocouples

FYI,

ABT has this proposal about how to retrofit the burner thermocouples with a more rugged design, but using the existing thermowells. They are also considering straightening the thermowells if the burner inner section is replaced.

Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

>>> "Tom Shults" <Tom@advancedburner.com> 3/15/2006 12:33:32 PM >>>
Hello Jerry. As we mentioned in our 2-06-06 message regarding thermocouples, we have completed our thermocouple test at the TC shop. This test related only to the thermocouple pipes on the 47 burners with the 3/8 inch TC pipe (not the new, replacement burner). We found the following.

The largest thermocouple sheath we can insert is 1/8 inch diameter. The 3/16 inch diameter just doesn't want to go with any reasonable force. Unless you require duplex elements, we recommend simplex due to the larger wire size that should be more rugged. Note that the 1/8 inch diameter sheath is considerably stronger than the 1/16 inch TCs that you have now.

We reviewed the entire TC pipe arrangement, typical for the 47 burners, including the nipple on the burner front. We concluded that if we want to use a spring-loaded TC, and avoid potential breakage of any TC head or connector parts, we should assemble the TC on site as described below.

Install a 3/8 to 1/2 NPT pipe bushing on the TC pipe nipple on the burner front for the attachment of the TC head.

We would provide an 1/8 inch diameter TC with a spring attached to a ring mounted to the TC sheath.

Insert the TC through the pipe nipple/bushing on the burner front by hand. (No tools were required to insert the 1/8 inch TC.)

The TC head, provided loose, would be screwed on. (The TC would not rotate since it is not attached to the head.)

The terminal block would be placed over the TC sheath with the wires passing through the middle of the block. The spring would become compressed as the terminal block is screwed down. Tighten the terminal block to the head.

Terminate the TC wires to the terminal block, and make the conduit and field wiring connections.

IP7_026386

This approach allows for insertion of the TC without rotation, spring loading, and support of the head by fittings, not the sheath. As you can see, however, some additional field work is required. We do not recommend trying to use a spring-loaded, pre-assembled unit as the insertion process may damage the components.

We would be willing to provide TCs as above at no cost to Intermountain for one burner to see if you like them and if they survive. If you would like us to do so, pls let us know whether simplex or duplex, and confirm that you want Type E TCs.

Recall that this issue stands alone from the "straight thermocouple pipe" issue which we are continuing to consider.

Thanks.

Tom

Thomas (Tom) W. Shults, PE
Project Manager
Advanced Burner Technologies
271 Route 202/206
PO Box 410
Pluckemin, NJ 07978
tom@advancedburner.com
Phone: 908 212 0573
Fax: 908 470 0479

From: Jerry Finlinson
Start: 3/16/2006
Due: 3/16/2006
Subject: Discuss IBAM, secondary air flow, primary air flow, sootblowers with Ken Hall.

Would assist with IBAM inspection in outage.
will provide quote on reinstalling wallblowers in OFA.

From: Jerry Finlinson
To: Bernell Warner
CC: Bill Morgan
Date: 3/20/2006 4:28 PM
Subject: closeout 2APA-E1630_R21 for Bill
Attachments: 2APA-E1630_R021 D03-04 JCF.dwg

Bernell,

Here is this drawing that needs to be closed out.

N:\Current\Projects\IGS03\IGS03-04 Unit 2 Modified Burners\BURNER FLOW XMTR\DWGS

2APA-E1630_R021 D03-04~JCF.dwg

Make sure that rev 20 and 21 are included, then close out the drawing, and I presume, check it out for Bill.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

From: Jerry Finlinson
To: Tom Shults
Date: 3/23/2006 10:13 AM
Subject: Re: Intermountain - Thermocouples

We'd like you to provide a sample thermocouple and the more durable simplex is fine. Are you talking about the long nozzle tip ones or the shorter coal pipe ones or both?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

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see, however, some additional field work is required. We do not recommend trying to use a spring-loaded, pre-assembled unit as the insertion process may damage the components.

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Recall that this issue stands alone from the "straight thermocouple pipe" issue which we are continuing to consider.

Thanks.

Tom

Thomas (Tom) W. Shults, PE
Project Manager
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271 Route 202/206
PO Box 410
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tom@advancedburner.com
Phone: 908 212 0573
Fax: 908 470 0479

From: Jerry Finlinson
To: Tom Shults
Date: 3/23/2006 2:44 PM
Subject: RE: Intermountain - Thermocouples

We are considering having the nozzle tip thermocouple (longest) switched to type K since we occasionally go over 1650F, but I need to verify how much error would be introduced by using type E thermocouple extension wire. Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

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>>> "Tom Shults" <Tom@advancedburner.com> 3/23/2006 12:13:33 PM >>>
Hi Jerry. We will supply TCs for both thermowells on one burner as described below. These will be simplex in type E.

Tom

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Thursday, March 23, 2006 11:13 AM
To: Tom@advancedburner.com
Subject: Re: Intermountain - Thermocouples

We'd like you to provide a sample thermocouple and the more durable simplex is fine. Are you talking about the long nozzle tip ones or the shorter coal pipe ones or both?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
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jerry-f@ipsc.com

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>>> "Tom Shults" <Tom@advancedburner.com> 3/15/2006 12:33:32 PM >>>
Hello Jerry. As we mentioned in our 2-06-06 message regarding thermocouples, we have completed our thermocouple test at the TC shop. This

IP7_026392

test related only to the thermocouple pipes on the 47 burners with the 3/8 inch TC pipe (not the new, replacement burner). We found the following.

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We would provide an 1/8 inch diameter TC with a spring attached to a ring mounted to the TC sheath.

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(No tools were required to insert the 1/8 inch TC.)

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We would be willing to provide TCs as above at no cost to Intermountain

for
one burner to see if you like them and if they survive. If you would
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us to do so, pls let us know whether simplex or duplex, and confirm
that you
want Type E TCs.

Recall that this issue stands alone from the "straight thermocouple
pipe"
issue which we are continuing to consider.

Thanks.

Tom

Thomas (Tom) W. Shults, PE
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Message transport security by GatewayDefender.com
11:13:39 AM ET - 3/23/2006

IP7_026394

From: Jerry Finlinson
To: Tom Shults
Date: 3/27/2006 12:53 PM
Subject: Re: Intermountain Thermocouples
Attachments: Thermocouple heads on existing burners 001 sm.jpg; Thermocouple heads on existing burners 002 sm.jpg; Thermocouple heads on existing burners 003 sm.jpg; ABT burner thermowell details 002 sm.jpg; ABT burner thermowell details 003 sm.jpg; ABT burner thermowell details 005 sm.jpg

Tom,

We ended up putting extension nipples on the original burners because we have 4 inches of insulation on the outside of our boiler. See attached photo.

We just went up and examined your newest burner that has the inner pipe pulled out. It has about 6.5 inches on the outside of the burner, which is about right. Having the pipe angled up would be good to get the TC head away from the flange.

For now send us one each of type E thermocouple.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

Always put a cute quote or sage advise at the end of your emails.

>>> "Tom Shults" <Tom@advancedburner.com> 3/24/2006 9:01:40 AM >>>
Good morning Jerry. In reviewing the TC length, I noticed that the nipple welded to the burner front extends only 2 inches minimum according to our drg. If this is not adequate due to insulation or whatever, we could provide another nipple. Let me know what extra length you need, but make sure that if we extend that we don't hit something else with the TC head. I understand that the existing nipple has a coupling on it. So, we could just screw a nipple into this coupling and then add the bushing and the TC head (per my 3-15-06 email regarding the 1/8 inch TCs).

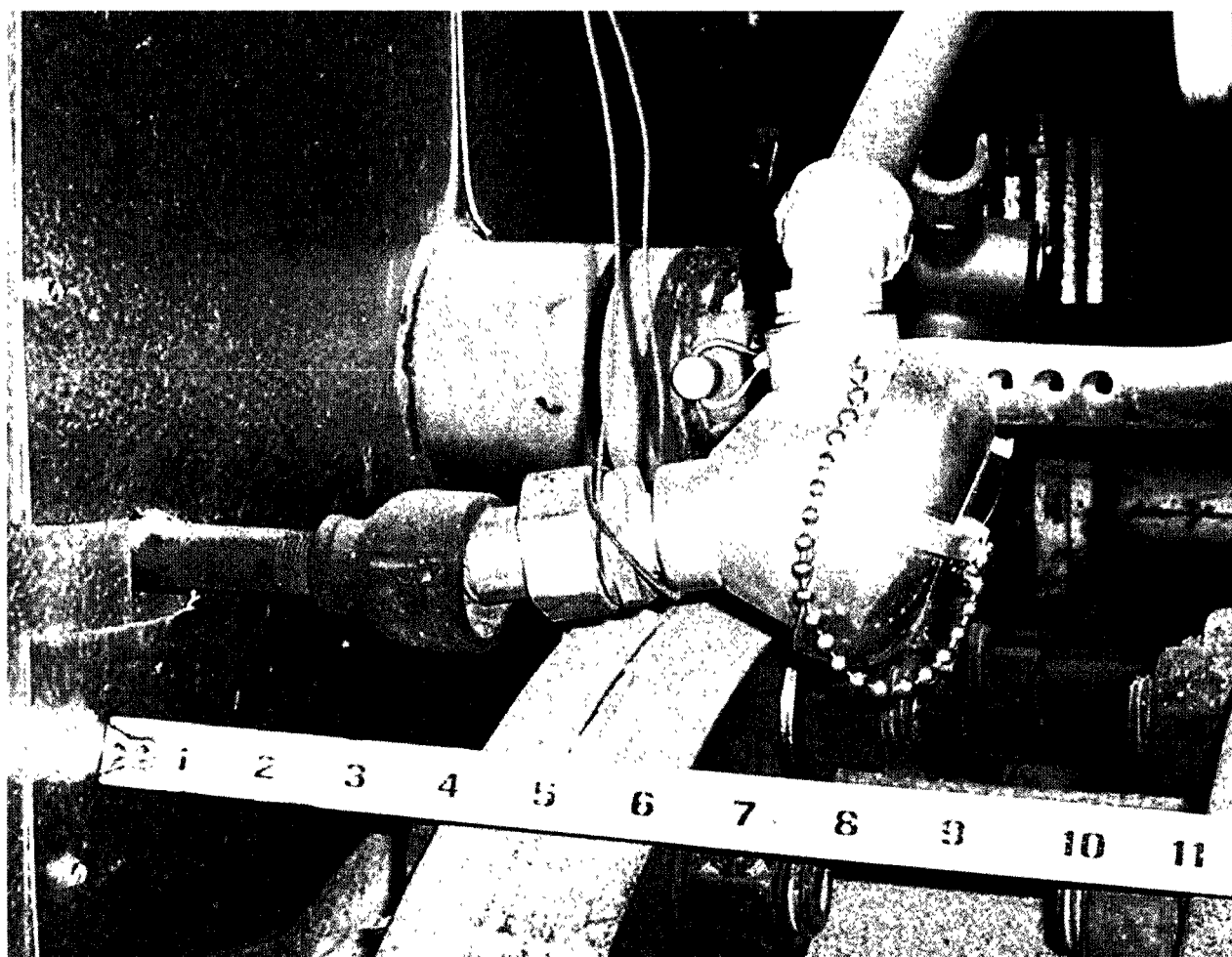
Pls let me know what you have, and what you need, so we can get the length correct.

Thanks.

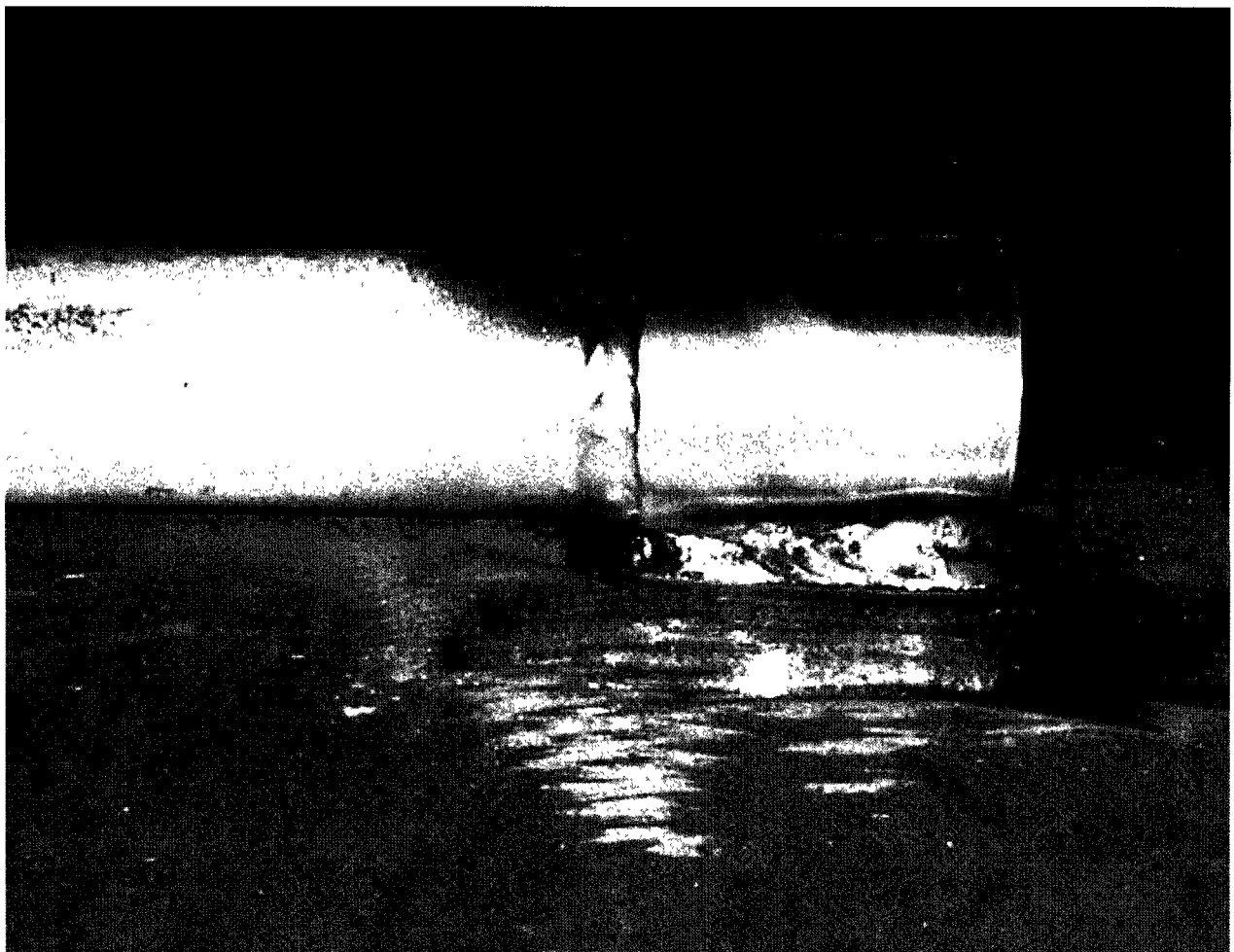
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IP7_026395

Phone: 908 212 0573
Fax: 908 470 0479



IP7_026397



IP7_026398

From: Jerry Finlinson
To: Tom Shults
Date: 3/27/2006 2:52 PM
Subject: Re: Intermountain Thermocouples

Jim,

Can you look up the length of the most recent spare burner thermocouples that we ordered.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

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Pls let me know what you have, and what you need, so we can get the length correct.

Thanks.

Thomas (Tom) W. Shults, PE
Project Manager
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271 Route 202/206
PO Box 410
Pluckemin, NJ 07978
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Phone: 908 212 0573
Fax: 908 470 0479

IP7_026399

From: Jerry Finlinson
To: Tom Shults
Date: 3/28/2006 10:59 AM
Subject: RE: Intermountain Thermocouples

Tom,
Actually, the thermocouple heads don't contact the flange, but they are very close. We like using the existing bell reducer fittings that we had made, although we should investigate the new design that you are proposing. But we don't like the bends in the thermowell and certainly don't want another shallow bend in the thermowell.

The recent spare thermocouples that we bought are of length 60.25 inches and 103 and 9/16 inches long less a
> little bit for the fittings that
> were removed.
>
> We ordered long ones and 7 short ones for spares.

We need 1/16 inch diameter TC's of length 60.25 and 103 & 9/16 inches. see DWG 10-4881. But we only need it with the 3/8 pipe nipple, which is different than your original drawing.

15pcs T-TEC #10-5217-2 \$79.65 net/ea
7pcs T-TEC #10-5217-1 \$76.50 net/ea
Shipment: 2 - 3 weeks aro.
Please ref our quotation #J0701EM2

Currently there are only 8 long nozzle tip thermocouples reading valid temps, so we are planning to abandon them until we get the burner coal pipe replaced. In the meantime we will weld some thermocouples on the pipe wall outside the windbox.

It turns out that they are going to be pulling out every coal pipe segment on every burner in order to install the nozzle shields. Maybe we should have them install a new straight thermowell at that time.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
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>>> "Tom Shults" <Tom@advancedburner.com> 3/27/2006 3:44:33 PM >>>
Hi Jerry. Did you mean this for me?

Note that the new TCs I intend to send to you will have a different length than any you have to date. I am thinking about how to get away from the flanges. A four inch nipple would be good but looks like it will have the

IP7_026400

head hitting the flange (see your photos). A shallow bend in the nipple might do the trick. I'll think on it. Is an additional 4 inch nipple enough? This should get you at least 6 inches away from the flange/windbox wall.

T.

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]

Sent: Monday, March 27, 2006 3:52 PM

To: Tom@advancedburner.com

Subject: Re: Intermountain Thermocouples

Jim,

Can you look up the length of the most recent spare burner thermocouples that we ordered.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
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435-864-6466 FAX 0776

jerry-f@ipsc.com

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Pls let me know what you have, and what you need, so we can get the length correct.

Thanks.

Thomas (Tom) W. Shults, PE

IP7_026401

Project Manager
Advanced Burner Technologies
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tom@advancedburner.com
Phone: 908 212 0573
Fax: 908 470 0479

Message transport security by GatewayDefender.com
3:52:10 PM ET - 3/27/2006

From: Jerry Finlinson
To: PUNCH
CC: Ken Hall
Date: 4/5/2006 11:42 AM
Subject: Burner Air Flow IBAM inspection - JCF
Attachments: Burner Windbox IBAM Inspection.wpd

FYI,

Performing an air leak check on the burner air flow pitot tubes, leaks were found in the welded fittings on the burner deck on F, B1, and G4. These should be repaired.

1 to 6 leaks from the soldered fittings inside the windbox on each burner level. These should be heliarc weld repaired. You could use existing fittings or the new fittings on order.

2 noisy solenoid valves, 1 disconnected thermocouple

We tightened leaky fittings inside 5 IBAM cabinets, and on 6 burner levels.

Note - the bottom levels have significant fly ash, the remaining levels have an inch or so. AP&F is scheduled to guzzle out the windboxes starting 12 April.

We left all IBAM purge timers set at 10 minutes until the repair work is done.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

IP7_026403

Engineering Services Inspection Report

INTERMOUNTAIN POWER SERVICE CORP.

System: 2SGA: Steam Generator (Windbox) Date: April 4, 2006
Description: Unit 2 Burner Windbox Inspection Page: 1 of 2
By: Garry Christensen

pictures in N:\current\outages\2006 outages\U2 2006 long Outage April\Burner-ABT repairs\pics\windbox inspection

D Row D1 Crack found in outer air sleeve at 4 o'clock position. D1 has two other TC's attached. Note locations on pictures.

D2 Cracks found in outer air sleeve at 8 o'clock and 9 o'clock positions. Bottom section of outer air sleeve has broken and fallen out. Fabricate section out of high temperature stainless steel and stitch weld in.

D3 Crack found on top of air sleeve just inside of OR rod brace. Also crack with a piece missing at bottom section of the air sleeve. D3 has two extra TC's attached also.

D6 Crack found on top of air sleeve at OR brace attachment.

Brace for outer air register sleeve arm showing signs of overheat.

H Row H1 Outer air sleeve seal ring weld broken at 10 o'clock position. Reweld

H2 Small crack in outer air sleeve at 2 o'clock position. Outer air seal ring weld broken at 5 o'clock position. Reweld on outer seal ring

H3 Outer air sleeve seal ring weld broken at 4 o'clock position. Reweld

H5 Outer air sleeve seal ring weld broken at 5 3/4 o'clock position. Reweld

H6 Outer air sleeve seal ring weld broken at 4 1/2 o'clock position. Reweld

Ash in windbox, largest amount between H3 and H4 burners. Guzzle out flyash.

C Row C1 Crack found in outer air sleeve at 8 o'clock position.

C2 Outer air sleeve seal ring weld broken at 5 o'clock position. Reweld

C3 Outer air sleeve seal ring weld broken at 6 o'clock position. Reweld

C5 Cracks found in outer air sleeve at 3,4, 7 and 8 o'clock positions.
Outer air sleeve seal ring weld crack at 2 o'clock position. Reweld

C6 Crack found in outer air sleeve at 12 o'clock position.
Outer air sleeve seal ring weld crack at 9 o'clock position. Reweld

Engineering Services Inspection Report

INTERMOUNTAIN POWER SERVICE CORP.

System: 2SGA: Steam Generator (Windbox)

Date: April 4, 2006

Description: Unit 2 Burner Windbox Inspection

Page: 2 of 2

By: Garry Christensen

pictures in N:\current\outages\2006 outages\U2 2006 long Outage April\Burner-ABT repairs\pics\windbox inspection

G Row G2 Whole top half of outer air sleeve seal ring has come loose. Reweld stitch welds 3/16" 1-18 on upper half.

Bottom support beam weld on the north end has broken and is lying on the floor before reaching G1 burner. Reposition beam and reweld.

Flyash in windbox. Guzzle out flyash.

E Row E4 Overheat on outer air sleeve seal ring at 6 o'clock position. Small crack found at 11 o'clock position in outer air sleeve.

E5 Cracks found in outer air sleeve at 11, 12 and 1 o'clock positions.

A Row A1 Outer air sleeve crack found at 12 o'clock position.

A2 Outer air sleeve ring seal weld cracked at 10 o'clock position. Reweld

A3 Overheat on outer air sleeve ring seal at 6 o'clock position. Reweld Small crack found in outer air sleeve at 1 o'clock position.

A5 Overheat on outer air sleeve seal ring at 6 o'clock position. Area burned through on ring.

Flyash in windbox mostly at middle burners. Guzzle out flyash.

F Row F3 Outer register air sleeve rod bent. Burner is to be replaced due to fire damage.

F4 Outer air sleeve ring seal welds on lower half broken. Reweld.

B Row B3 Crack found in outer air sleeve at 11 o'clock position.

B row has the most flyash in windbox. Guzzle out flyash.

IP7_026405

From: "Ken Hall" <khppquip@earthlink.net>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Matt Maragos" <mmaragos@airmonitor.com>
Date: 2/27/2007 10:57 AM
Subject: FW: Intermountain Power IBAMs
Attachments: Intermountain IBAM Calculator WO 50633.xls

Jerry:

The last time Dave Earley and I were at the plant to discuss coal flow measurement with Aaron and Gary they mentioned again how inaccurate they feel the IBAMS are compared to their total secondary air flow measurement. Dave Earley is convinced that the IBAMS are very accurate if there are no leaks and if the correct polynomials are used with the correct vein positions.

I have asked Matt Maragos to help us ensure that we do everything possible to help IPP have correct burner airflow measurement. Matt has attached a spread sheet. Please review and let us know when you would be available for a conference call to discuss the attached information

Thank you,

Ken Hall

PowerQuip

801-546-6262

From: Matt Maragos [mailto:mmaragos@airmonitor.com]
Sent: Monday, February 26, 2007 7:20 PM
To: 'Ken Hall'
Subject: Intermountain Power IBAMs

Ken,

Attached is the spreadsheet that I generated for Intermountain Power (specific to their plant).

This can be used to take the dP and convert it to mass flow. The numbers generated by the spreadsheet can then be compared to the DCS.

IP7_026406

This is the first step.

Please call me to discuss tomorrow, I would like to get into the plant's hands so we can discuss with them and move ahead.

Thanks.

Matt

<<...>>

Intermountain Burner Airflow, AMC W.O. # 50633

INPUT▶	Barometric pressure =	29.921 inches Hg
INPUT▶	Windbox air temperature =	590.0 degrees F
INPUT▶	Windbox static pressure =	5.0 inches w.c.
	Windbox air temperature =	1050.0 degrees R
	Windbox static pressure =	0.367 inches Hg
	Absolute Windbox static pressure =	30.288 inches Hg
	Standard Air Density =	0.07513 lbs/ft ³
	Standard Air Temperature =	68.0 degrees F
	Standard Air Temperature =	527.7 degrees R
	Standard Air Pressure =	29.921 inches Hg
	Actual Air Density =	0.03822 lbs/ft ³
INPUT▶	Spin Vane Position =	30 degrees
INPUT▶	Shroud Position (inches open) =	9.000 inches open
INPUT▶	IBAM Differential Pressure =	0.4563 inches w.c.
	Probe Coefficient =	0.4767
	Burner Airflow (Measured) =	37,176 ACFM
	Burner Air Mass Flow =	85,304 lbs/hr
INPUT▶	Coal Flow =	7,500 lbs/hr
	AFR =	11.374

LOOK UP CHART FOR IBAM FORMULAE:

Spin Vane Position (deg)	Calc. Probe Coefficient
30	0.4767
45	0.4717
60	0.4668

Intermountain Burner Airflow, AMC W.O. # 50633

INPUT▶	Barometric pressure =	29.921 inches Hg
INPUT▶	Windbox air temperature =	590.0 degrees F
INPUT▶	Windbox static pressure =	5.0 inches w.c.
	Windbox air temperature =	1050.0 degrees R
	Windbox static pressure =	0.367 inches Hg
	Absolute Windbox static pressure =	30.288 inches Hg
	Standard Air Density =	0.07513 lbs/ft ³
	Standard Air Temperature =	68.0 degrees F
	Standard Air Temperature =	527.7 degrees R
	Standard Air Pressure =	29.921 inches Hg
	Actual Air Density =	0.03822 lbs/ft ³
INPUT▶	Spin Vane Position =	30 degrees
INPUT▶	Shroud Position (inches open) =	8.000 inches open
INPUT▶	IBAM Differential Pressure =	0.4541 inches w.c.
	Probe Coefficient =	0.4380
	Burner Airflow (Measured) =	34,152 ACFM
	Burner Air Mass Flow =	78,366 lbs/hr
INPUT▶	Coal Flow =	7,500 lbs/hr
	AFR =	10.449

LOOK UP CHART FOR IBAM FORMULAE:

Spin Vane Position (deg)	Calc. Probe Coefficient
30	0.4380
45	0.4307
60	0.4302

Intermountain Burner Airflow, AMC W.O. # 50633

INPUT▶	Barometric pressure =	29.921 inches Hg
INPUT▶	Windbox air temperature =	590.0 degrees F
INPUT▶	Windbox static pressure =	5.0 inches w.c.
	Windbox air temperature =	1050.0 degrees R
	Windbox static pressure =	0.367 inches Hg
	Absolute Windbox static pressure =	30.288 inches Hg
	Standard Air Density =	0.07513 lbs/ft^3
	Standard Air Temperature =	68.0 degrees F
	Standard Air Temperature =	527.7 degrees R
	Standard Air Pressure =	29.921 inches Hg
	Actual Air Density =	0.03822 lbs/ft^3
INPUT▶	Spin Vane Position =	30 degrees
INPUT▶	Shroud Position (inches open) =	8.000 inches open
INPUT▶	IBAM Differential Pressure =	0.4541 inches w.c.
	Probe Coefficient =	0.4412
	Burner Airflow (Measured) =	34,396 ACFM
	Burner Air Mass Flow =	78,924 lbs/hr
INPUT▶	Coal Flow =	7,500 lbs/hr
	AFR =	10.523

LOOK UP CHART FOR IBAM FORMULAE:

Spin Vane Position (deg)	Calc. Probe Coefficient
30	0.4412
45	0.4350
60	0.4347

From: Jerry Finlinson
To: Aaron Nissen; Garry Christensen
Date: 2/27/2007 11:01 AM
Subject: Fwd: FW: Intermountain Power IBAMs
Attachments: Intermountain IBAM Calculator WO 50633.xls

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

>>> "Ken Hall" <khppquip@earthlink.net> 2/27/2007 11:01 AM >>>
Jerry:

The last time Dave Earley and I were at the plant to discuss coal flow measurement with Aaron and Gary they mentioned again how inaccurate they feel the IBAMS are compared to their total secondary air flow measurement. Dave Earley is convinced that the IBAMS are very accurate if there are no leaks and if the correct polynomials are used with the correct vein positions.

I have asked Matt Maragos to help us ensure that we do everything possible to help IPP have correct burner airflow measurement. Matt has attached a spread sheet. Please review and let us know when you would be available for a conference call to discuss the attached information

Thank you,

Ken Hall

PowerQuip

801-546-6262

From: Matt Maragos [<mailto:mmaragos@airmonitor.com>]
Sent: Monday, February 26, 2007 7:20 PM
To: 'Ken Hall'
Subject: Intermountain Power IBAMs

IP7_026411

Ken,

Attached is the spreadsheet that I generated for Intermountain Power (specific to their plant).

This can be used to take the dP and convert it to mass flow. The numbers generated by the spreadsheet can then be compared to the DCS.

This is the first step.

Please call me to discuss tomorrow, I would like to get into the plant's hands so we can discuss with them and move ahead.

Thanks.

Matt

<<...>>

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Ken Hall" <khpquip@earthlink.net>
Date: 3/6/2007 8:53 AM
Subject: RE: Intermountain Power IBAMs

Jerry,

Please let me know if you have any questions regarding the IBAM flow calculator that Ken sent to you last week.

I look at this as a first step. By putting IBAM and burner data into the spreadsheet, you can confirm the mass flow calculations you are currently using in the DCS are correct and are providing accurate flows. From there, we will know what needs to be done next.

Thanks.

Matt

-----Original Message-----

From: Ken Hall [mailto:khpquip@earthlink.net]
Sent: Tuesday, February 27, 2007 10:01 AM
To: 'Jerry Finlinson'
Cc: 'Matt Maragos'
Subject: FW: Intermountain Power IBAMs

Jerry:

The last time Dave Earley and I were at the plant to discuss coal flow measurement with Aaron and Gary they mentioned again how inaccurate they feel the IBAMS are compared to their total secondary air flow measurement. Dave Earley is convinced that the IBAMS are very accurate if there are no leaks and if the correct polynomials are used with the correct vein positions.

I have asked Matt Maragos to help us ensure that we do everything possible to help IPP have correct burner airflow measurement. Matt has attached a spread sheet. Please review and let us know when you would be available for a conference call to discuss the attached information

Thank you,

Ken Hall
PowerQuip
801-546-6262

From: Matt Maragos [mailto:mmaragos@airmonitor.com]
Sent: Monday, February 26, 2007 7:20 PM
To: 'Ken Hall'
Subject: Intermountain Power IBAMs

Ken,

Attached is the spreadsheet that I generated for Intermountain Power

IP7_026413

(specific to their plant).

This can be used to take the dP and convert it to mass flow. The numbers generated by the spreadsheet can then be compared to the DCS. This is the first step.

Please call me to discuss tomorrow, I would like to get into the plant's hands so we can discuss with them and move ahead.

Thanks.

Matt

<<...>>

From: Jerry Finlinson
To: Ken Hall; Matt Maragos
Date: 3/16/2007 11:04 AM
Subject: IPSC IBAM flows
Attachments: U2 DCS IBAM flows.doc

Ken,

You previously sent the spreadsheet with the IBAM flows.

I have copied two screens from our DCS showing how they do the air flow correction calculations.

Please review and see if you think we are going it right.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

IP7_026415

Function Block Type - G4 - DASLib.BurnerAirFlow

Editor Edit View Tools Window Help

100%

Parameters
Current Values
Data Types
Attributes
Function Blocks
4
Initial Values
Description

```

----- Use Design Pressure & Temperature on BQ of measured values -----
----- Design Temperature = 690 Deg F -----
----- Design Pressure = 2.8 in Hg -----
----- Standard Barometric Pressure = 29.921 in Hg -----
IF Ta Status[16#C0] <> 16#C0 THEN
  T_air[709.69] = 690.
ELSE
  T_air[709.69] = Ta Value[709.69].
END_IF
IF Pg Status[16#C0] <> 16#C0 THEN
  P_gauge[2.1196] = 2.8.
ELSE
  P_gauge[2.1196] = Pg Value[2.1196].
END_IF
IF Pb Status[16#C0] <> 16#C0 THEN
  P_bar[25.451] = 29.921.
ELSE
  P_bar[25.451] = Pb Value[25.451].
END_IF
----- Convert Duct Pressure To Absolute -----
P_abs[27.571] = P_gauge[2.1196] + P_bar[25.451].
----- Probe Coefficient -----
K1[0.51452] = (-0.0004485864) * P[10.0]**3 + 0.0128252354 * P[10.0]**2 - 0.0793247289 * P[10.0] + 0.4738300277.
----- Primary Correction -----
Q1[53733.9] = 20504.23018 * K1[0.51452] * sqrt(DP Value[0.61149] * (T_air[709.69] + 460) / P_abs[27.571])
----- Secondary Correction -----
Q2acfm[50853.3] = 0.92780 * Q1[53733.9] + 998.99211.
Flow Value[95.351] = 79.54675312 * Q2acfm[50853.3] * P_abs[27.571] / (T_air[709.69] + 460) / 1000.
----- Propagate Quality of DP to Calculated Flow -----
Flow Status[16#C0] = DP Status[16#C0].

```

Code/

NUM

Parameters Variables External Variables Function Blocks

4	5	Code
---	---	------

NE IN

From: "Ken Hall" <khpquip@earthlink.net>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Matt Maragos" <mmaragos@airmonitor.com>
Date: 3/16/2007 11:42 AM
Subject: RE: IPSC IBAM flows
Attachments: Ken Hall (khpquip@earthlink.net).vcf

Jerry:

Thank you for the information we will review and get back to you.

Thank you,

Ken Hall
PowerQuip
801-546-6262

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, March 16, 2007 11:04 AM
To: Matt Maragos; Ken Hall
Subject: IPSC IBAM flows

Ken,

You previously sent the spreadsheet with the IBAM flows.

I have copied two screens from our DCS showing how they do the air flow correction calculations.

Please review and see if you think we are going it right.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

IP7_026418

From: Garry Christensen
To: Jim Knapp
CC: Howard Scott; Jerry Finlinson
Date: 5/14/2007 12:44 PM
Subject: Unit 2 B4 burner IBAM hose
Attachments: U2 B4 IBAMs.jpg

Jim, the hose connecting the burner B4 IBAMs to the piping is not long enough and has twisted. (see photo). Please put in a work order to correct the problem. Thanks

From: "Ken Hall" <khpquip@earthlink.net>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 8/19/2007 11:34 PM
Subject: RE: sootblower photo
Attachments: Ken Hall (khpquip@earthlink.net).vcf

Jerry:

That is exactly what I needed Jerry. Thank you for all your help. I always appreciate your willingness to work with us to look at every possible solution. Thanks for taking so much time with Matt to help us better identify what needs to be done to make the IBAMS a valuable tool. Have a good week!

Thank you,

Ken Hall
PowerQuip
801-546-6262

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, August 17, 2007 1:25 PM
To: Ken Hall
Subject: sootblower photo

Ken,

Thanks for coming by yesterday, I think we are on the right track.

Let me know if these are the photos you wanted.

Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

IP7_026420

From: Jerry Finlinson
To: Bill Morgan; Dean Wood; Jon Christensen; Ken Nielson
Date: 8/22/2007 6:13 PM
Subject: Fwd: RE: Air flow questions

FYI,

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

>>> "Matt Maragos" <mmaragos@airmonitor.com> 8/22/2007 3:08 PM >>>
Jerry,

I have been out in the wind tunnel, testing the system that we used at Intermountain. Based upon my preliminary review and calculations the traverse system is within specification. We are in the process of changing over the duct work (other systems needed to be installed) and I should be able to do one more test this week.

I will send the K-factor sheet shortly.

I am not sure if I completely understand your question.

Are you talking about the air density decreasing due to a static pressure change in the pipe?

A static pressure decrease would decrease the density and to maintain mass flow, the velocity must increase. This comment is correct. You would need to have a significantly large pressure change.

E.g., if the mills were discharging at 40" w.c. static and the pressure at the burner was only 20" w.c. static, the resulting increase in velocity would be a few percentage points. If it was 80 FPS, it might go to about 83 or 84 FPS. This is a pretty large change in static pressure and actual real word would not likely be this high.

What is the area at the burner nozzle? Significant reduction in open area would dramatically increase the local velocity.

From the Pf-FLO report, you can see that velocities at 70% load were in the 90-100 FPS range.

Matt

-----Original Message-----

From: Ken Hall [<mailto:khpquip@earthlink.net>]
Sent: Wednesday, August 22, 2007 9:14 AM
To: 'Jerry Finlinson'; mmaragos@airmonitor.com
Cc: 'Garry Christensen'

IP7_026421

Subject: RE: Air flow questions

Jerry:

Matt will need to answer this question but I do know from my experience in working with UCC designing fly ash conveying systems, that we always have to enlarge the pipe diameter as we get further away from the blower and closer to the silo to decrease the fly ash conveying velocity. This is typically over a much greater conveying distance than from a mill to a burner. If we are conveying 1000' we will start with an 8" line and then go to 10" and then to 12". If we do not increase the pipe size the velocities go way up. UCC has been using two phase flow to convey fly ash for over 90 years and maintain the proper velocity is how they size all their system. I think the distance between the mill outlet and the burner inlet is fairly short so the effects on velocity would not be as great.

Thank you,

Ken Hall
PowerQuip
801-546-6262

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Wednesday, August 22, 2007 9:50 AM
To: mmaragos@airmonitor.com; Ken Hall
Cc: Garry Christensen
Subject: Air flow questions

Matt,

We have a couple of questions. Have you been able to check the calibration on the probe and electronics that we were traversing here last week? Have you done any calculations to see if we need to modify our Kfactors?

Also, we were wondering about burner pipe velocity. It seems that the pressure in the burner pipes would decrease from the mill pressure to the boiler pressure. This would suggest that as the pressure decreases as the flow approaches the boiler, the density would decrease and the velocity would increase. Do you know if that is the case? So right at the burner nozzle, it would be quite a high velocity due to the flow density, correct?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

IP7_026422

From: Jerry Finlinson
To: Matt Maragos
Date: 8/22/2007 6:15 PM
Subject: RE: Air flow questions

Matt,

Thanks for the info. We'll be looking forward to see your Kfactor corrections. Yes we were wondering about the duct pressure as you described.

Later, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

>>> "Matt Maragos" <mmaragos@airmonitor.com> 8/22/2007 3:08 PM >>>
Jerry,

I have been out in the wind tunnel, testing the system that we used at Intermountain. Based upon my preliminary review and calculations the traverse system is within specification. We are in the process of changing over the duct work (other systems needed to be installed) and I should be able to do one more test this week.

I will send the K-factor sheet shortly.

I am not sure if I completely understand your question.

Are you talking about the air density decreasing due to a static pressure change in the pipe? Yes

A static pressure decrease would decrease the density and to maintain mass flow, the velocity must increase. This comment is correct. You would need to have a significantly large pressure change.

E.g., if the mills were discharging at 40" w.c. static and the pressure at the burner was only 20" w.c. static, the resulting increase in velocity would be a few percentage points. If it was 80 FPS, it might go to about 83 or 84 FPS. This is a pretty large change in static pressure and actual real word would not likely be this high.

What is the area at the burner nozzle? Significant reduction in open area would dramatically increase the local velocity.

From the Pf-FLO report, you can see that velocities at 70% load were in the 90-100 FPS range.

Matt

-----Original Message-----

IP7_026423

From: Ken Hall [<mailto:khpquip@earthlink.net>]
Sent: Wednesday, August 22, 2007 9:14 AM
To: 'Jerry Finlinson'; mmaragos@airmonitor.com
Cc: 'Garry Christensen'
Subject: RE: Air flow questions

Jerry:

Matt will need to answer this question but I do know from my experience in working with UCC designing fly ash conveying systems, that we always have to enlarge the pipe diameter as we get further away from the blower and closer to the silo to decrease the fly ash conveying velocity. This is typically over a much greater conveying distance than from a mill to a burner. If we are conveying 1000' we will start with an 8" line and then go to 10" and then to 12". If we do not increase the pipe size the velocities go way up. UCC has been using two phase flow to convey fly ash for over 90 years and maintain the proper velocity is how they size all their system. I think the distance between the mill outlet and the burner inlet is fairly short so the effects on velocity would not be as great.

Thank you,

Ken Hall
PowerQuip
801-546-6262

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Wednesday, August 22, 2007 9:50 AM
To: mmaragos@airmonitor.com; Ken Hall
Cc: Garry Christensen
Subject: Air flow questions

Matt,

We have a couple of questions. Have you been able to check the calibration on the probe and electronics that we were traversing here last week? Have you done any calculations to see if we need to modify our Kfactors?

Also, we were wondering about burner pipe velocity. It seems that the pressure in the burner pipes would decrease from the mill pressure to the boiler pressure. This would suggest that as the pressure decreases as the flow approaches the boiler, the density would decrease and the velocity would increase. Do you know if that is the case?

IP7_026424

So right at the burner nozzle, it would be quite a high velocity due to the flow density, correct?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

From: Jerry Finlinson
To: Matt Maragos
CC: Garry Christensen; Ken Hall
Date: 8/27/2007 4:11 PM
Subject: Re: Traverse Workbooks & K-Factors

Matt,

Thanks for sending these calculations.
We have one question. The K factors that you are suggesting, do they include the fact that 6 of the mills already had the Kfactor turned on? Do we need to multiply the existing K factor x this new K factor? Or does this new K factor include the existing one?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

>>> "Matt Maragos" <mmaragos@airmonitor.com> 8/24/2007 2:55 PM >>>
Garry & Jerry,

Attached is the spreadsheet from the traverse testing last week. The K-factors have been summarized on the first page. The individual K-factor calculation sheets are also included for reference. These K-factors are meant to be installed in the CAMM. The are prior to the square root numbers. If you need K-factors for the DCS, applied to the flow rates, please let me know.

I am going to add a couple of items into the final report, but I wanted to get this into your hands now as I will be out next week.

Please let me know if you have any questions.

Thank you.

Matt

IP7_026426

From: Jerry Finlinson
To: Matt Maragos
CC: Aaron Nissen; DCS Group; Dean Wood; Garry Christensen; Ken Hall
Date: 8/29/2007 8:02 AM
Subject: U2 IBAM flow calculation

FYI,

When Matt was here a couple of weeks ago we reviewed the U2 IBAM flow calculations in the DCS. We were expecting the secondary air flow to total about 5800 kpph, but the IBAM flows were totalling 4800 kpph, which is 17% low. We found that the outer register settings in the calculations were all at 10 inches, when the burners were actually at 9, 6 and 5 inches. Yesterday Lance adjusted the calculations to have the proper outer register settings. Now the IBAM flows total 3800 kpph, so we are 34% low.

Currently the H mill is offline with the secondary air dampers at 25% for cooling air, but it's IBAM air flow total is nearly the same as the other burner levels with secondary air dampers over 70% open. We need to have a more accurate curve fit, so that we can trust the data.

Let us know what we can do to assist.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

IP7_026427

From: Jerry Finlinson
To: Matt Maragos
CC: Aaron Nissen; DCS Group; Dean Wood; Garry Christensen; Ken Hall
Date: 8/29/2007 8:03 AM
Subject: U2 IBAM flow calculation

FYI,

When Matt was here a couple of weeks ago we reviewed the U2 IBAM flow calculations in the DCS. We were expecting the secondary air flow to total about 5800 kpph, but the IBAM flows were totalling 4800 kpph, which is 17% low. We found that the outer register settings in the calculations were all at 10 inches, when the burners were actually at 9, 6 and 5 inches. Yesterday Lance adjusted the calculations to have the proper outer register settings. Now the IBAM flows total 3800 kpph, so we are 34% low.

Currently the H mill is offline with the secondary air dampers at 25% for cooling air, but it's IBAM air flow total is nearly the same as the other burner levels with secondary air dampers over 70% open. We need to have a more accurate curve fit, so that we can trust the data.

Let us know what we can do to assist.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

IP7_026428

From: Jerry Finlinson
Start: 8/29/2007
Due: 8/28/2007
Subject: Check in U2 IBAM flow change 8/28/4:30 from Lance.

From: Jerry Finlinson
To: Matt Maragos
Date: 8/30/2007 1:56 PM
Subject: RE: Traverse Workbooks & K-Factors

I was expecting the changes to be more on the order of 4 or 5 % verses our old k factors.
I see, you were comparing against the volu probe dp, not including the k factors.

Later, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

>>> "Matt Maragos" <mmaragos@airmonitor.com> 8/30/2007 8:47 AM >>>
Jerry,

To confirm, it is correct to input the new K-factor by itself replacing the existing K-factors (not multiplying it by the existing K-factor).
The comparison to create the K-factors was the traverse vs. the raw VOLU-probe dP (i.e., this did not include the K-factor).

It looks like you have already completed this (per your more recent email). The results you achieved look about right. Once I am back in the office, I can take a closer look at this numbers, but upon initial review everything looks correct.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Monday, August 27, 2007 3:11 PM
To: Matt Maragos
Cc: Ken Hall; Garry Christensen
Subject: Re: Traverse Workbooks & K-Factors

Matt,

Thanks for sending these calculations.
We have one question. The K factors that you are suggesting, do they include the fact that 6 of the mills already had the Kfactor turned on? Do we need to multiply the existing K factor x this new K factor? Or does this new K factor include the existing one?

Thanks, Jerry

IP7_026430

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
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jerry-f@ipsc.com

There's always more to do than you can do.

>>> "Matt Maragos" <mmaragos@airmonitor.com> 8/24/2007 2:55 PM >>>
Garry & Jerry,

Attached is the spreadsheet from the traverse testing last week. The K-factors have been summarized on the first page. The individual K-factor calculation sheets are also included for reference. These K-factors are meant to be installed in the CAMM. The are prior to the square root numbers. If you need K-factors for the DCS, applied to the flow rates, please let me know.

I am going to add a couple of items into the final report, but I wanted to get this into your hands now as I will be out next week.

Please let me know if you have any questions.

Thank you.

Matt

IP7_026431

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Ken Hall" <khpquip@earthlink.net>
Date: 9/4/2007 8:25 AM
Subject: RE: U2 IBAM flow calculation

Jerry,

Did you recalculate the damper position for H mill in inches then apply it to the IBAM flow equation? This is required to get the correct value from the conversion equation.

I would appreciate if you could forward PI data from the H Mill burners and one other mill's burners over the period just before the H Mill burners when out of service to about an hour after the H Mill burners' SA dampers were adjusted to 25% for cooling air. The IBAM dP from each burner and the calculated SA is the data I would like from PI, then I would need to know the SA damper position in inches over that period of time.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, August 29, 2007 7:03 AM
To: Matt Maragos
Cc: Ken Hall; Aaron Nissen; Bill Morgan; Chris Mork; Dean Wood; Garry Christensen; Jerry Finlinson; Jim Knapp; Jon Christensen; Ken Nielson; Lance Johnson; Steve Higgs
Subject: U2 IBAM flow calculation

FYI,

When Matt was here a couple of weeks ago we reviewed the U2 IBAM flow calculations in the DCS. We were expecting the secondary air flow to total about 5800 kpph, but the IBAM flows were totalling 4800 kpph, which is 17% low. We found that the outer register settings in the calculations were all at 10 inches, when the burners were actually at 9, 6 and 5 inches. Yesterday Lance adjusted the calculations to have the proper outer register settings. Now the IBAM flows total 3800 kpph, so we are 34% low.

Currently the H mill is offline with the secondary air dampers at 25% for cooling air, but it's IBAM air flow total is nearly the same as the other burner levels with secondary air dampers over 70% open. We need to have a more accurate curve fit, so that we can trust the data.

Let us know what we can do to assist.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
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IP7_026432

Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

From: Jerry Finlinson
To: Garry Christensen
Date: 9/4/2007 8:34 AM
Subject: Fwd: RE: U2 IBAM flow calculation

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com
There's always more to do than you can do.

>>> "Matt Maragos" <mmaragos@airmonitor.com> 9/4/2007 8:24 AM >>>
Jerry,

Did you recalculate the damper position for H mill in inches then apply it to the IBAM flow equation? This is required to get the correct value from the conversion equation.

I would appreciate if you could forward PI data from the H Mill burners and one other mill's burners over the period just before the H Mill burners when out of service to about an hour after the H Mill burners' SA dampers were adjusted to 25% for cooling air. The IBAM dP from each burner and the calculated SA is the data I would like from PI, then I would need to know the SA damper position in inches over that period of time.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Wednesday, August 29, 2007 7:03 AM
To: Matt Maragos
Cc: Ken Hall; Aaron Nissen; Bill Morgan; Chris Mork; Dean Wood; Garry Christensen; Jerry Finlinson; Jim Knapp; Jon Christensen; Ken Nielson; Lance Johnson; Steve Higgs
Subject: U2 IBAM flow calculation

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Currently the H mill is offline with the secondary air dampers at 25% for cooling air, but it's IBAM air flow total is nearly the same as the other burner levels with secondary air dampers over 70% open. We

IP7_026434

need to have a more accurate curve fit, so that we can trust the data.

Let us know what we can do to assist.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

From: Jerry Finlinson
To: Matt Maragos
CC: Garry Christensen; Ken Hall
Date: 9/11/2007 1:22 PM
Subject: RE: U2 IBAM flow calculation
Attachments: U2 IBAM Secondary air DP 11sep07.jpg; U2 IBAM Secondary air flow & temp 11sep07.jpg; U2 IBAM Secondary air flow calcs 11sep07.jpg; U2 IBAM Secondary air flow 11sep07.jpg; U2 IBAM burner settings 11sep07.jpg

Matt,

I think you have a bit of confusion. I just made JPEG copies of our current operating data in the PI and Process Book historian. Currently on unit 2, the G mill is out of service. Most of the windboxes have a pressure of 2.5 to 3 inches, but the G windbox is negative 0.5 inches. That is because it's inlet damper position is 25% and the others are 75%.

The G mill has a IBAM DP of 0.2, where the other burners are 0.6 to 0.8. Yet the average flow in G level burners is 52 kpph and other levels are 75 kpph. It seems that there should be a bigger difference.

One of the sheets has all the current burner settings.

Let me know if you still need further data.

Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776

jerry-f@ipsc.com

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>>> "Matt Maragos" <mmaragos@airmonitor.com> 9/4/2007 8:24 AM >>>

Jerry,

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I would appreciate if you could forward PI data from the H Mill burners and one other mill's burners over the period just before the H Mill burners when out of service to about an hour after the H Mill burners' SA dampers were adjusted to 25% for cooling air. The IBAM dP from each burner and the calculated SA is the data I would like from PI, then I would need to know the SA damper position in inches over that period of time.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Wednesday, August 29, 2007 7:03 AM
To: Matt Maragos

IP7_026436

Cc: Ken Hall; Aaron Nissen; Bill Morgan; Chris Mork; Dean Wood; Garry Christensen; Jerry Finlinson; Jim Knapp; Jon Christensen; Ken Nielson; Lance Johnson; Steve Higgs
Subject: U2 IBAM flow calculation

FYI,

When Matt was here a couple of weeks ago we reviewed the U2 IBAM flow calculations in the DCS. We were expecting the secondary air flow to total about 5800 kpph, but the IBAM flows were totalling 4800 kpph, which is 17% low. We found that the outer register settings in the calculations were all at 10 inches, when the burners were actually at 9, 6 and 5 inches. Yesterday Lance adjusted the calculations to have the proper outer register settings. Now the IBAM flows total 3800 kpph, so we are 34% low.

Currently the H mill is offline with the secondary air dampers at 25% for cooling air, but it's IBAM air flow total is nearly the same as the other burner levels with secondary air dampers over 70% open. We need to have a more accurate curve fit, so that we can trust the data.

Let us know what we can do to assist.

Thanks, Jerry

Jerry Finlinson, Control Engineer
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435-864-6466 FAX 0776

jerry-f@ipsc.com

There's always more to do than you can do.

IP7_026437

```

Time> Sel> Edt> Info/Goto Trend File> PI>
0 Message: 02 SA FLE SECONDARY AIR FLOW WITH DP'S 11-Sep-07 12:59:38
11/2 14.1 69.3 75.9 3.0 73. 0.604 0.686 0.533 0.680 0.596 0.610
11/3 15.1 85.3 76.7 3.9 75. 0.649 0.736 0.655 0.710 0.757
11/4 12.9 71.3 75.8 3.6 80. 0.766 0.758 0.708 0.804 0.598 0.713
11/5 11.8 66.9 76.6 3.5 99. 1.395 1.080 0.691 0.789 0.981
11/6 10.5 70.4 77.3 3.6 77. 0.747 0.591 0.569 0.693 0.560 0.718
11/7 17.6 77.3 76.0 3.9 76. 0.741 0.618 0.627 0.585 0.581 0.638
11/8 20.1 76.3 69.7 3.9 76. 0.828 0.637 0.557 0.604 0.579 0.789
11/9 0.0 0.0 25.0 3.2 51. 0.226 0.246 0.276 0.207 0.225 0.300
11/10 11.50.6 19.3 16.7 2.93 11.183
11/11 4.8 79.3 76.0 0.43 11.17 723.1 740.1 951.1
EndTime= 11-Sep-07 12:59:38 /EvalTime= 11-Sep-07 12:59:38 /BankRate= 0
End Time, Evaluation Time, Pan Rate, Interval, Zoom

```

W	E6	E5	E4	E3	E2	E1	R
	120.	168.	173.	165.	181.	167.	
	451.	308.	355.	344.	384.	473.	
	85.	68.	61.	68.	62.	88.	

A6	A5	A4	A3	A2	A1
163	186	159	123	175	178
359	388	363	409	389	404
89	90	71	67	70	95

F6	F5	F4	F3	F2	F1
163	172	170	162	165	163
288	344	305	326	406	401
45	34	54	71	52	33

W	B6	B5	B4	B3	B2	B1
184.	185.	186.	187.	188.	189.	
190.	191.	192.	193.	194.	195.	
196.	197.	198.	199.	200.	201.	



EndTime: 11-Sep-07 13:02:48 /EvalTime: 11-Sep-07 13:02:48 /PanRate: 0
End Time, Evaluation Time, Pan Rate, Interval, Zoom

From: Jerry Finlinson
Start: 3/30/2008
Due: 3/30/2008
Subject: Inspected boiler front side burners. E1&2 were plugged with clinkers. The ones with sleeves inside, really cracked up bad.

F3 outer register didn't uncover as many holes or push forward as far with the same 7 hole setting.

From: "Jan Lewis" <powerquip@earthlink.net>
To: <jerry-f@ipsc.com>
CC: "Stefanie Larsen" <stefanielarsen@powerquip.net>, "Ken Hall" <khpqui...
Date: 4/10/2008 7:51 AM
Subject: FW: Power Quip insurance update
Attachments: Ken Hall (khpquip@earthlink.net).vcf

Morning Jerry,

I just faxed over a copy of our current commercial general liability policy to personnel, and Ken is on his way down to see you! Please let me know if you need anything further.

Thank you,

Jan Lewis

60 East Gentile St.
Layton, UT 84041
Tel: (801) 546-6262
Fax: (801) 544-1504
E-Mail: janlewis@powerquip.net or powerquip@earthlink.net
Web: <http://www.powerquip.net>
Please refer to the quote number for expedited service.

-----Original Message-----

From: Ken Hall [mailto:khpquip@earthlink.net]
Sent: Wednesday, April 09, 2008 10:54 PM
To: 'Jan Lewis'
Cc: 'Stefanie Larsen'
Subject: FW: Power Quip insurance update

Jan:

Will you please fax before 9:00 am so they have it before I get to the plant.

Thank you,

Ken Hall
PowerQuip
801-546-6262

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, April 09, 2008 11:47 AM
To: Ken Hall
Cc: Steve Jackson; Van Beckstrom
Subject: Power Quip insurance update

Ken,

Steve Jackson just brought me over a copy of your insurance form for last year.

It shows that your workers comp liability is good until 7/31/2008, so that part is OK,

IP7_026441

but your commercial general liability expired on 9/5/2007. You probably have an updated form with updated numbers.

Please FAX that in to personnel at 435-864-6666.

Then we should be already to do our inspection tomorrow.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

From: Jerry Finlinson
To: Alan Dewsnap; Will Lovell
Date: 4/11/2008 8:15 AM
Subject: U2 Burner Secondary air flow pitots - IBAM

Will,

As I mentioned we snoop checked the U2 burner pitots on the E & D levels yesterday. We found a few leaks that need weld repair.

E level had no weld repair leaks.

D1 has a leak in the iron piping near the cabinet.

Inside the windbox on the burners 2 leaks on D1 and 1 leak on D5 & D6. The leaky joints have been marked with white tape.

We noticed there is an AP&F welder in there working on the burners. Would you like to arrange for them to fix it? Or would you prefer to have a different crew go in later?

I'll try to get the remainder of the windboxes inspected today and get you a complete report.

Thanks, Jerry

Jerry Finlinson, Control Engineer
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435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

IP7_026443

From: Howard Scott
To: Jerry Finlinson
Date: 4/11/2008 3:32 PM
Subject: Re: Fwd: FW: IPP IBAM snoop results

We already used high temp RTV. I can't find this other stuff you wrote about.

>>> Jerry Finlinson 4/11/2008 12:28 PM >>>

Howard,

Air Monitor is recommending high temp Grafoil thread sealant for the IBAM connections. It is rated at 1175F, which is much higher than the Red Permtex sealant.

Is that something that we stock here onsite?
I tried looking in TIMS under sealant and Grafoil, but can't find anything.
If not, we could have Jim order us a couple of tubes.

Thanks, Jerry

Jerry Finlinson, Control Engineer
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/11/2008 8:54 AM >>>

Jerry,

See attached information from Andy. This is what we have recommended in the past. The pricing below is from McMaster Carr, we do not sell it.

Hope this helps.

Thanks.

Matt

-----Original Message-----

From: Andy Chew [<mailto:achew@airmonitor.com>]
Sent: Friday, April 11, 2008 8:38 AM
To: 'Matt Maragos'
Subject: RE: IPP IBAM snoop results

I would not recommend most RTV's including Red Permatex which may only be rated to 600°F.

In the past we have suggested:

Grafoil Thread Sealant from McMaster Carr P/N: 1965K1
High-Temperature/Pressure Pipe Thread Sealant 125-G(4-oz)Tube, 1175 Deg F

IP7_026444

Max Temp, 7500 Max PSI
In stock at \$34.20 Each

MSDS attached.

-----Original Message-----

From: Matt Maragos [<mailto:mmaragos@airmonitor.com>]
Sent: Friday, April 11, 2008 6:10 AM
To: 'Andy Chew'
Subject: FW: IPP IBAM snoop results

Do you have the type of sealant we would typically recommend for IBAMs?

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Friday, April 11, 2008 7:02 AM
To: Matt Maragos; Ken Hall
Cc: Howard Scott
Subject: IPP IBAM snoop results

FYI,

Yesterday we snoop checked the IBAMs on Unit 2 during our outage. Ken Hall was here to observe. Generally they are in good condition. On the E level we found no leaks inside the windbox, but on D we found 3 leaks.

There were also 5 leaks on the outside, right where the flexible line connects onto the burner. Apparently the pipe coming through the windbox wall is pretty hot, since it's 700F in there. Maybe it's melting the Teflon that they put on the pipe threads. What would you recommend that we use as a thread sealant? I was thinking that some red RTV might do a pretty good job. Any other suggestions?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

IP7_026445

From: Jerry Finlinson
To: Andy Chew; Matt Maragos
CC: Howard Scott; jbauman@airmonitor.com; Jim Knapp; Ken Hall
Date: 4/14/2008 7:51 AM
Subject: IBAM scaling question
Attachments: U2 IBAM Veltron xducer 208-050-04.JPG; U2 IBAM Veltron xducer -05 backside.JPG; U2 IBAM Veltron jumpers.JPG

FYI,

In our recent outage we decided to have the technicians calibrate all the IBAM transmitters. They are scaled to 2.0 inches DP max, so we are having them put in 0 and 2.0 inches to ensure that the 4-20 mA signal is scaled properly. Right off we found one that only went to 16 mA. After some experimentation, it would only calibrate the span, if we changed the natural span to 2.5 inches.

I looked on the transmitters to see if there is a way to tell what the factory natural span is supposed to be. Here are some photos of the transmitter board on some that we have spanned at 2.0 inches.

Anyway, it appears that we have most of our transducers at 2.0 inches and a few at 2.5 inches. I'll continue the calibration and let you know if we find more this way.

Can you identify what the 208-050-04 sticker means? how about the -05 on the backside?

Thanks, Jerry

Jerry Finlinson, Control Engineer
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jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

IP7_026446



IP7_026447

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Howard Scott" <HOWARD-S@ipsc.com>, "Jim Knapp" <JIM-KNAPP@ipsc.com>
Date: 4/14/2008 3:23 PM
Subject: RE: IBAM scaling question

Jerry,

Based upon what our production people tell me, the -05 doesn't mean it is a 208-050-05 and we need to use the part number on the opposite side (208-050-04, which indicates these are 2" w.c. natural span transducers). It is possible to over-range these (to approx. 110%, perhaps higher), but I am not sure if you would get many up to 2.5" w.c. or why it would not calibrate to 2" w.c.

Have you checked the other configuration setting in the menus? We need to verify that it electronically configured to accept a 2" natural span and the calibrated span is 2" w.c.

Please let me know more of the details how these are being calibrated.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 14, 2008 8:07 AM
To: Matt Maragos
Cc: Howard Scott; Jim Knapp
Subject: RE: IBAM scaling question

That's interesting. I'm pretty sure both those photos were of the same Veltron. The sticker on front said -04 and on back -05.

Our PA was originally at 5" wc, but we have exchanged them and increased them to 10 "wc.

We'll continue our calibration and see what we find.

Another question about the purging.

I was noticing on the IBAM cabinet wiring detail drawing that the first transmitter had wiring on TB 29,30 to the bottom of the purge controller, with purge on internal or external.

All the rest had wiring on TB 11 & 13, they were set to external purge only. Can you explain how this is supposed to work?

Thanks, Jerry

Jerry Finlinson, Control Engineer
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435-864-6466 FAX 0776

IP7_026448

cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 8:09 AM >>>
Jerry,

A 208-050-04 is a 2" w.c. natural span transducer, while the 208-050-05 is a 5" w.c. natural span transducer.

I will continue to research, but I believe the PA was 5" w.c. and the IBAMs were 2" w.c.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Monday, April 14, 2008 6:51 AM

To: Andy Chew; Matt Maragos

Cc: jbauman@airmonitor.com; Ken Hall; Howard Scott; Jim Knapp

Subject: IBAM scaling question

FYI,

In our recent outage we decided to have the technicians calibrate all the IBAM transmitters. They are scaled to 2.0 inches DP max, so we are having them put in 0 and 2.0 inches to ensure that the 4-20 mA signal is scaled properly. Right off we found one that only went to 16 mA. After some experimentation, it would only calibrate the span, if we changed the natural span to 2.5 inches.

I looked on the transmitters to see if there is a way to tell what the factory natural span is supposed to be. Here are some photos of the transmitter board on some that we have spanned at 2.0 inches.

Anyway, it appears that we have most of our transducers at 2.0 inches and a few at 2.5 inches.

I'll continue the calibration and let you know if we find more this way.

Can you identify what the 208-050-04 sticker means? how about the -05 on the backside?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd

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Delta, UT 84624
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
CC: "Howard Scott" <HOWARD-S@ipsc.com>, "Jim Knapp" <JIM-KNAPP@ipsc.com>
Date: 4/14/2008 4:00 PM
Subject: RE: IBAM scaling question

The IBAM AUTO-purging uses the internal timer on the first VELTRON II. It is wired into the ALC Purge Controller to ensure the purging takes place sequentially. At the completion of the 1st VELTRON II AUTO-purge, the controller initiates the next VELTRON II AUTO-purge system (externally).

Do you have the wiring ladder diagram for these? I can forward if not.

Thanks.

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 14, 2008 8:07 AM
To: Matt Maragos
Cc: Howard Scott; Jim Knapp
Subject: RE: IBAM scaling question

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Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 8:09 AM >>>
Jerry,

A 208-050-04 is a 2" w.c. natural span transducer, while the 208-050-05 is a

IP7_026451

5" w.c. natural span transducer.

I will continue to research, but I believe the PA was 5" w.c. and the IBAMs were 2" w.c.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Monday, April 14, 2008 6:51 AM

To: Andy Chew; Matt Maragos

Cc: jbauman@airmonitor.com; Ken Hall; Howard Scott; Jim Knapp

Subject: IBAM scaling question

FYI,

In our recent outage we decided to have the technicians calibrate all the IBAM transmitters. They are scaled to 2.0 inches DP max, so we are having them put in 0 and 2.0 inches to ensure that the 4-20 mA signal is scaled properly. Right off we found one that only went to 16 mA. After some experimentation, it would only calibrate the span, if we changed the natural span to 2.5 inches.

I looked on the transmitters to see if there is a way to tell what the factory natural span is supposed to be. Here are some photos of the transmitter board on some that we have spanned at 2.0 inches.

Anyway, it appears that we have most of our transducers at 2.0 inches and a few at 2.5 inches.

I'll continue the calibration and let you know if we find more this way.

Can you identify what the 208-050-04 sticker means? how about the -05 on the backside?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

IP7_026452

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 4/14/2008 5:57 PM
Subject: RE: IBAM scaling question

Jerry,

We might want to take a closer look at that unit, sounds like it is malfunctioning. It is possible that it is not accurately outputting and may be in need of repair.

I suggest that we issue an RA and you send it here for inspection and recalibration. We can let you know what we find.

Please let me know what you would like to do.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 14, 2008 4:32 PM
To: Matt Maragos
Subject: RE: IBAM scaling question

All of them have the natural span set at 2".
Except the E4 transmitter, which won't calibrate if the span is at 2.0". When we do a span cal, we get a bad input error. So we changed the span to 2.5", then do a span cal and it works great. So that is rather curious.

It appears to be functioning fine now. But we do have the natural span set at 2.5 inches.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 2:09 PM >>>
Jerry,

Based upon what our production people tell me, the -05 doesn't mean it is a 208-050-05 and we need to use the part number on the opposite side (208-050-04, which indicates these are 2" w.c. natural span transducers).

IP7_026453

It is possible to over-range these (to approx. 110%, perhaps higher), but I am not sure if you would get many up to 2.5" w.c. or why it would not calibrate to 2" w.c.

Have you checked the other configuration setting in the menus? We need to verify that it electronically configured to accept a 2" natural span and the calibrated span is 2" w.c.

Please let me know more of the details how these are being calibrated.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Monday, April 14, 2008 8:07 AM

To: Matt Maragos

Cc: Howard Scott; Jim Knapp

Subject: RE: IBAM scaling question

That's interesting. I'm pretty sure both those photos were of the same Veltron. The sticker on front said -04 and on back -05.

Our PA was originally at 5" wc, but we have exchanged them and increased them to 10 "wc.

We'll continue our calibration and see what we find.

Another question about the purging.

I was noticing on the IBAM cabinet wiring detail drawing that the first transmitter

had wiring on TB 29,30 to the bottom of the purge controller, with purge on internal or external.

All the rest had wiring on TB 11 & 13, they were set to external purge only.

Can you explain how this is supposed to work?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 8:09 AM >>>
Jerry,

A 208-050-04 is a 2" w.c. natural span transducer, while the 208-050-05 is a 5" w.c. natural span transducer.

IP7_026454

I will continue to research, but I believe the PA was 5" w.c. and the IBAMs were 2" w.c.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]

Sent: Monday, April 14, 2008 6:51 AM

To: Andy Chew; Matt Maragos

Cc: jbauman@airmonitor.com; Ken Hall; Howard Scott; Jim Knapp

Subject: IBAM scaling question

FYI,

In our recent outage we decided to have the technicians calibrate all the IBAM transmitters. They are scaled to 2.0 inches DP max, so we are having them put in 0 and 2.0 inches to ensure that the 4-20 mA signal is scaled properly. Right off we found one that only went to 16 mA. After some experimentation, it would only calibrate the span, if we changed the natural span to 2.5 inches.

I looked on the transmitters to see if there is a way to tell what the factory natural span is supposed to be. Here are some photos of the transmitter board on some that we have spanned at 2.0 inches.

Anyway, it appears that we have most of our transducers at 2.0 inches and a few at 2.5 inches. I'll continue the calibration and let you know if we find more this way.

Can you identify what the 208-050-04 sticker means? how about the -05 on the backside?

Thanks, Jerry

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435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

IP7_026455

From: "Matt Maragos" <mmaragos@airmonitor.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 4/14/2008 5:58 PM
Subject: RE: IBAM AUTO-purging uses the internal time
Attachments: 50633 R2 As-Built Submittal 4-16-04.pdf

Jerry,

Here is the entire as-built submittal. Page 5 starts the wiring details. I think there are three pages on the wiring.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 14, 2008 4:32 PM
To: Matt Maragos
Subject: RE: IBAM AUTO-purging uses the internal time

Matt,

Thanks for the details on the auto purging.
Please send me the wiring ladder diagram,
I'm not sure if I have that one.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 3:29 PM >>>
The IBAM AUTO-purging uses the internal timer on the first VELTRON II. It is wired into the ALC Purge Controller to ensure the purging takes place sequentially. At the completion of the 1st VELTRON II AUTO-purge, the controller initiates the next VELTRON II AUTO-purge system (externally).

Do you have the wiring ladder diagram for these? I can forward if not.

Thanks.

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 14, 2008 8:07 AM
To: Matt Maragos
Cc: Howard Scott; Jim Knapp

IP7_026456

Subject: RE: IBAM scaling question

That's interesting. I'm pretty sure both those photos were of the same Veltron. The sticker on front said -04 and on back -05.

Our PA was originally at 5" wc, but we have exchanged them and increased them to 10 "wc.

We'll continue our calibration and see what we find.

Another question about the purging.

I was noticing on the IBAM cabinet wiring detail drawing that the first transmitter had wiring on TB 29,30 to the bottom of the purge controller, with purge on internal or external. All the rest had wiring on TB 11 & 13, they were set to external purge only. Can you explain how this is supposed to work?

Thanks, Jerry

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jerry-f@ipsc.com

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>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 8:09 AM >>>
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Matt

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Monday, April 14, 2008 6:51 AM
To: Andy Chew; Matt Maragos
Cc: jbauman@airmonitor.com; Ken Hall; Howard Scott; Jim Knapp
Subject: IBAM scaling question

FYI,

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IP7_026457

ensure that the 4-20 mA signal is scaled properly. Right off we found one that only went to 16 mA. After some experimentation, it would only calibrate the span, if we changed the natural span to 2.5 inches.

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Anyway, it appears that we have most of our transducers at 2.0 inches and a few at 2.5 inches.

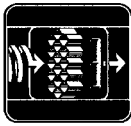
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Thanks, Jerry

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**AIR MONITOR
CORPORATION**

P O Box 6358
Santa Rosa, CA 95406
707 544 2706 - P
707 526 2825 - F

AS BUILT SUBMITTAL TRANSMITTAL

To Sal Ferrera
Advanced Burner Technologies
P.O Box 410
Pluckemin, NJ 07978

Date April 16, 2004

AMC Work Order 50633
Purchase Order A03-008-413
Project Intermountain - IBAMS

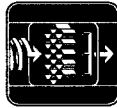
cc Mike Stapf, Sr. (mstapf@ix.netcom.com)

Project Manager Andrew Chew
Sent Via sal@advancedburner.com

Enclosed find.

1 As-Built Submittal, Rev. 2

IP7_026459



**AIR MONITOR
CORPORATION**

**WORK ORDER 50633
PURCHASE ORDER A03-008-413**

AS BUILT SUBMITTAL

PROJECT Intermountain - IBAMS

LOCATION Delta, UT

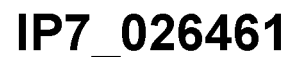
EQUIPMENT IBAM, VELTRON II in AUTO-purge/SP,
Burner Performance Testing and CFD Modeling

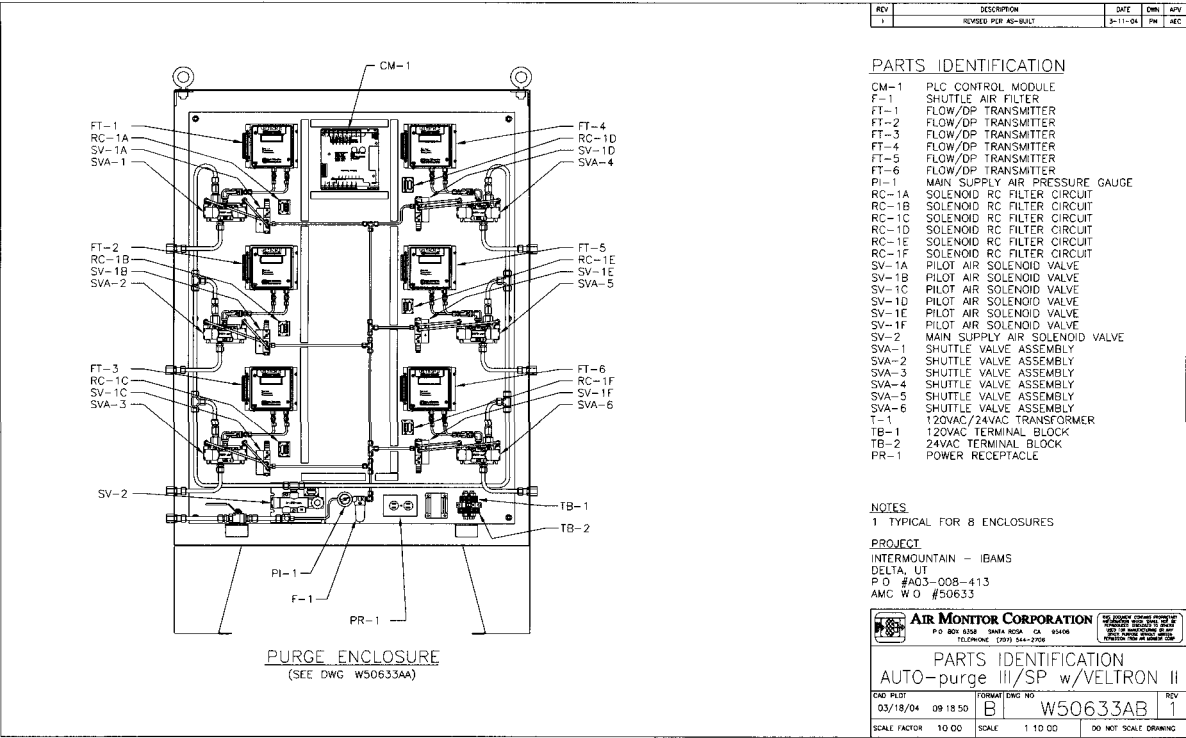
REPRESENTATIVE Stapf Energy Services

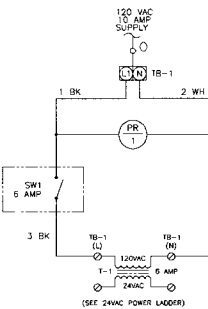
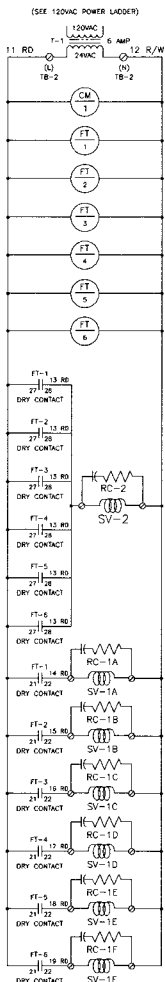
CONTACT Mike Stapf, Sr.

PHONE 610-783-7166

Date	Rev	Project Manager
12/12/03	0	Andrew Chew
03/19/04	1, AS-BUILT	Andrew Chew
04/16/04	2, AS-BUILT	Andrew Chew







- WIRING NUMBERS/COLORS
- 1-10 120VAC POWER
 - 11-20 24VAC POWER
 - 21-40 24VDC POWER
 - 41-60 24VDC SIGNALS
 - 61-80 DRY CONTACTS
 - BLACK 120VAC, LINE
 - WHITE 120VAC, NEUTRAL
 - RED 24VAC, LINE
 - RED/WHITE 24VAC, NEUTRAL
 - BLUE 24VDC (+)
 - BLUE/WHITE 24VDC (-)
 - ORANGE 24VDC SIGNAL (+)
 - BLUE/WHITE 24VDC SIGNAL (-)
 - YELLOW DRY CONTACTS

NOTES

1 TYPICAL FOR 8 ENCLOSURES


PROJECT

INTELMOUNTAIN - 18AWS

DELTA UT

DELTA UT

AUC W/O #50633

**AIR MONITOR CORPORATION**
10000 W. 10th Ave. Suite 100
Denver, CO 80231
Tel: 303.751.7100
Fax: 303.751.7101
www.airmonitorcorp.com

POWER LADDER DIAGRAM
AUTO-purge III/SP w/ELTRON II

DESIGNED BY: 03/18/04 08:18:12

FORMED BY: B

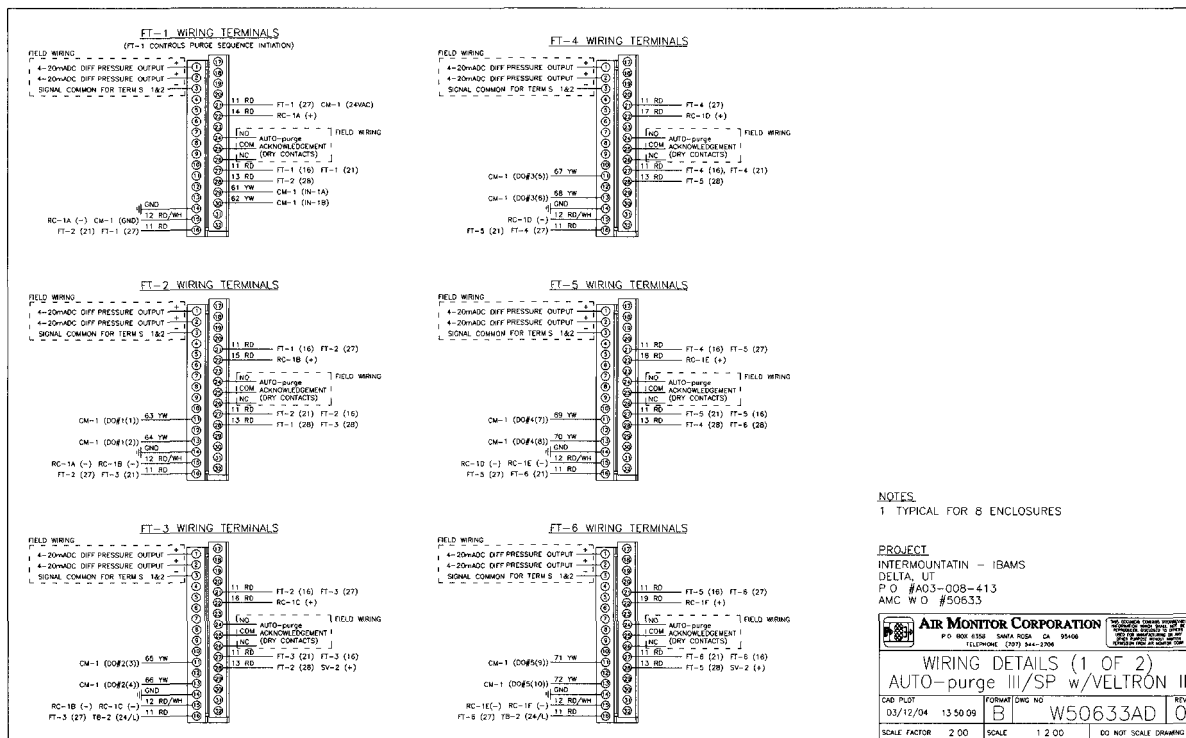
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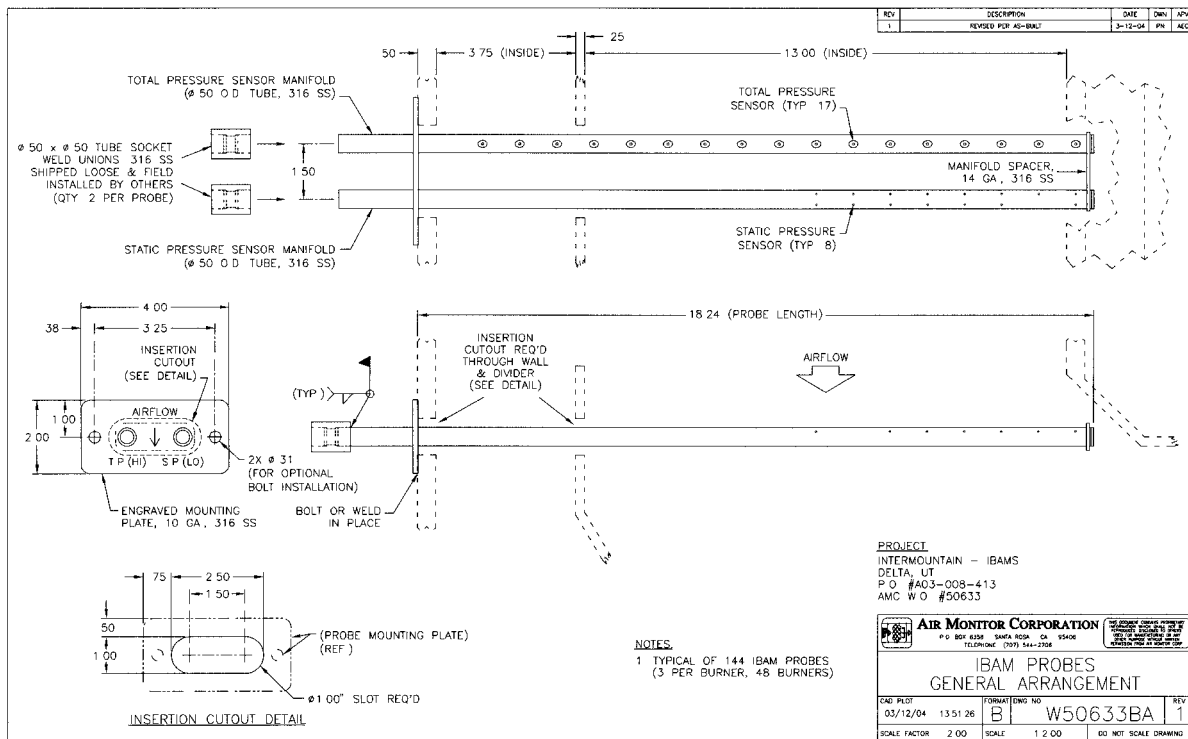
SCALE FACTOR: 8.00

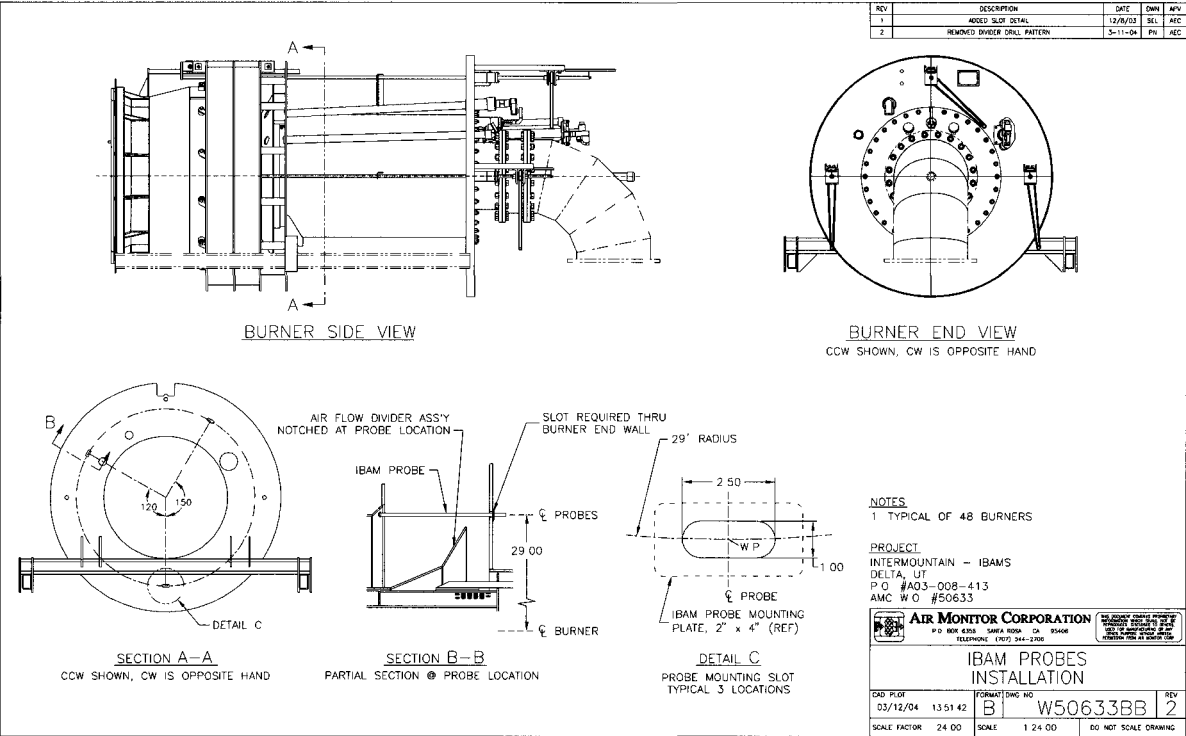
SCALE: 1:1

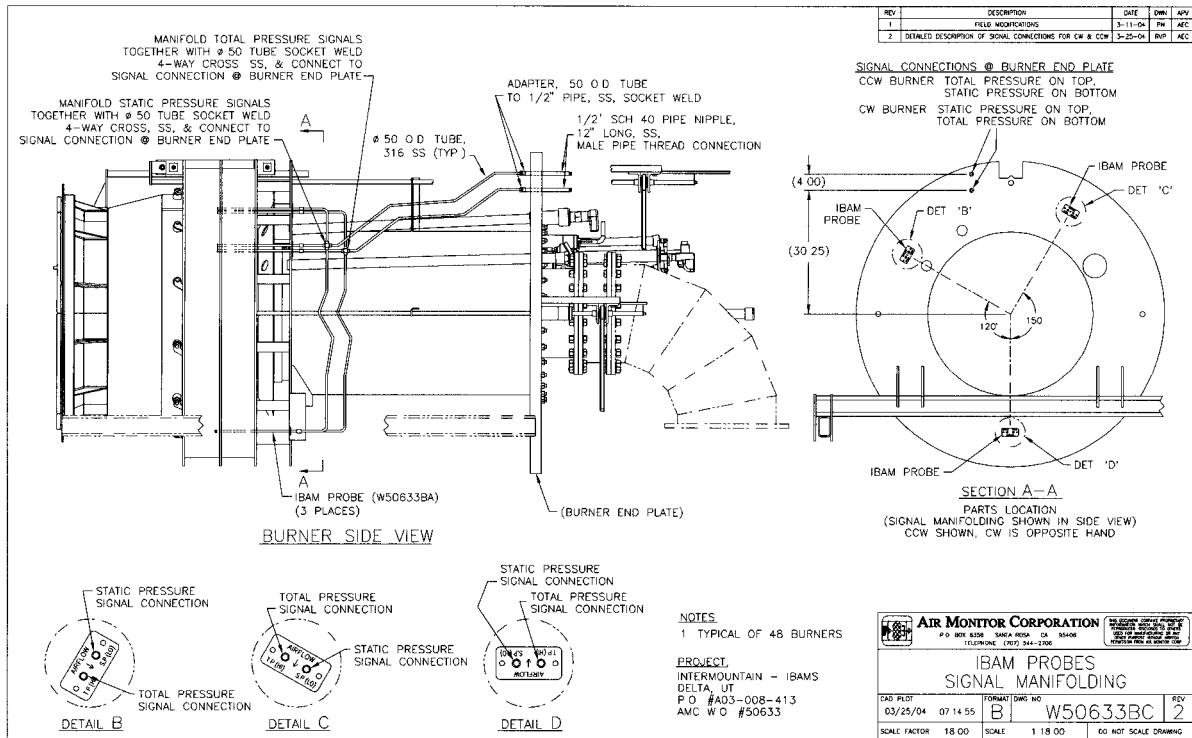
DO NOT SCALE DRAWING

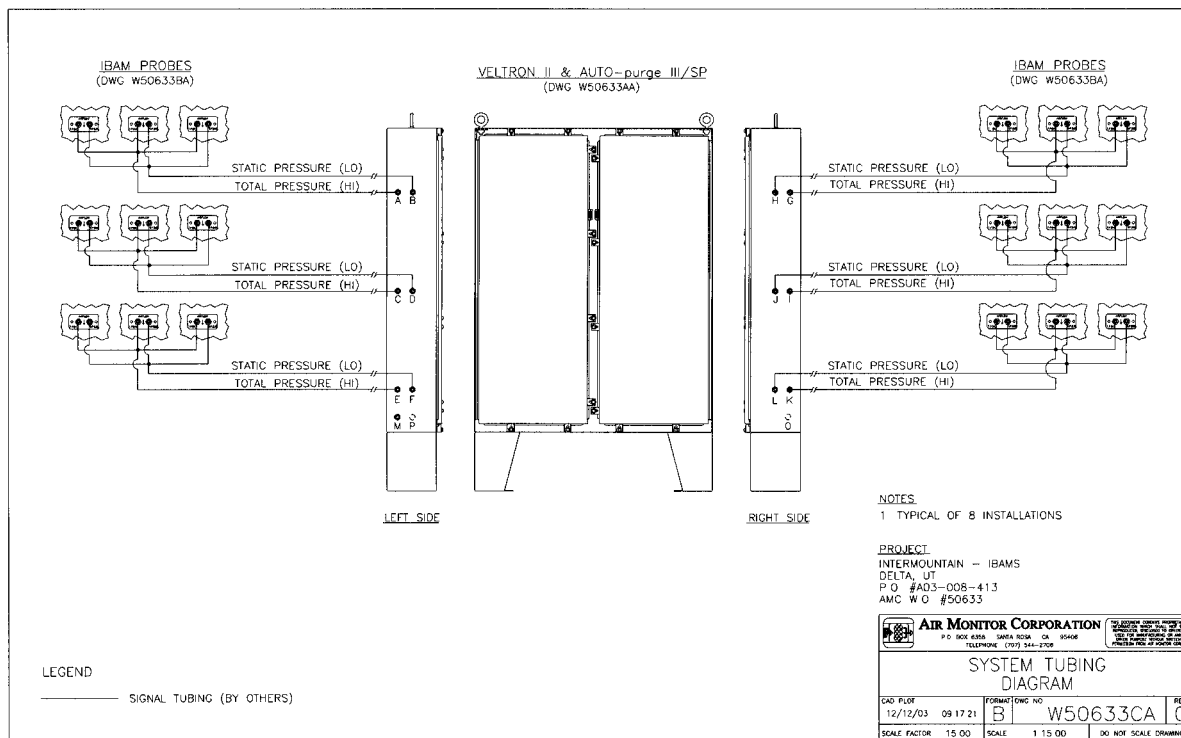
REV	DESCRIPTION	DATE	BY	CHK
1	REVISION 1.0 - 03/18/04	3-17-04	BN	BN











AUTO-purge III INSTALLATION GUIDE

Air Requirement.

80 to 125 psig at 100 CFM, oil and dirt free 1 to 24 purge cycles per day, with a field selectable duration between 30 and 120 seconds during which compressed air is released

Line Size from AUTO-purge Panel to Flow Measuring Station or Probes.

<u>Distance from AUTO-purge panel to flow measuring station air probe.</u>	<u>Tube Size.</u>
< 25'	1/2" S S tube
25' - 50'	3/4" S S tube
> 50'	1 0" S S tube

Accumulator Tank (strongly recommended).

Requires coalescing filter, pressure regulator, and check valve at the tank inlet

- 120 gallons - All CA stations
- 120 gallons - Multiple VOLU-probes having a combined length greater than 10'
- 80 gallons - One or more VOLU-probes having a combined length less than 10'

Line from Accumulator Tank to AUTO-purge Panel.

25' maximum length, 1/2" pipe (minimum) Recommend locating accumulator tank as close as possible to AUTO-purge panel

Electrical Power Requirement.

None when used with an Air Monitor transmitter (NOTE This adds 36VA to the transmitter's power requirement)
24VAC, 36VA when not initiated by an Air Monitor transmitter
120VAC, 10 amp when an optional enclosure heater is installed

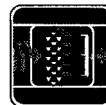
Ambient Temperature.

40°F-140°F For ranges above or below this ambient temperature, use of panel heater and/or cooler is required.

Purge Frequency.

Once/day minimum, once/hour maximum

P.O. Box 6358 • Santa Rosa, CA 95406 ☎ (707) 544-2706 ☎ (707) 526-2825 Fax ☎ www.airmonitor.com



AIR MONITOR
CORPORATION

SUB-M009, Rev 5 (8/01)

8.30.2

IP7_026470

VELTRON II

ULTRA-LOW RANGE DIFFERENTIAL PRESSURE/ FLOW TRANSMITTER

OPTIONS <input type="checkbox"/> Alarms or <input checked="" type="checkbox"/> AUTO-purge Management <input type="checkbox"/> Auxiliary Output <input type="checkbox"/> Terminal Cover/Conduit Connection	Special Function <input type="checkbox"/> % Deviation <input type="checkbox"/> Summed Flow <input type="checkbox"/> Averaged Flow <input type="checkbox"/> Differential Flow <input type="checkbox"/> Low Select <input type="checkbox"/> High Select	Power <input type="checkbox"/> 24VAC <input type="checkbox"/> 20-40VDC <input checked="" type="checkbox"/> 120VAC (via external transformer)	Certification <input type="checkbox"/> Standard <input type="checkbox"/> NIST Traceable Display <input checked="" type="checkbox"/> 2x20 LCD (Std) <input type="checkbox"/> 4x20 LCD
---	--	--	---

PERFORMANCE SPECIFICATIONS Accuracy. $\pm 0.1\%$ of Natural Span, including non-linearity, hysteresis, deadband, and non-repeatability Stability. $\pm 0.5\%$ of Natural Span for one year Temperature Effect. Zero. None, corrected by AUTO-zero Span 0.015% of Full Span/ $^{\circ}\text{F}$	Mounting Position Effect. None, corrected by AUTO-zero Transducer Response Time. 0.5 seconds to reach 98% of a step change Power Consumption. Standard 18VA at 24VAC, 13VA at 24VDC, 36VA at 120VAC With AUTO-purge Management 54VA at 24VAC, 48VA at 24VDC, 108VA at 120VAC
--	---

FUNCTIONAL SPECIFICATIONS Digital Outputs. Dual form C dry contacts rated for 3 Amps at 24VAC/VDC for optional Hi/Lo alarm. Dual Form A dry contacts rated for 3 amps at 24VAC/VDC for AUTO-purge activation and acknowledgment Digital Inputs. Dry contact for AUTO-purge external start command Analog Outputs. Dual transmitter outputs are individually configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mA DC. Two additional outputs are optionally available Analog Inputs. A single input is field configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mA DC. For use with optional special function. AUTO-purge Management. AUTO-purge cycle is initiated via an external dry contact input, or via an internal timer with field selectable frequencies of 1 to 24 hours, in 1 hour increments. An SPDT dry contact controls the AUTO-purge System, a second dry contact provides remote purge activation acknowledgment Power Supply. Standard 24VAC (20-28VAC) or 24VDC (20-40VDC), with automatic selection. Optional 120VAC (100-132VAC), via external transformer	Low Pass Filtration. Response time to reach 98% of a step change is adjustable from 2.0 to 250.0 seconds Automatic Zeroing. Accuracy Within 0.1% of calibrated span Frequency Every 1 to 24 hours on 1 hour intervals Overpressure and Static Pressure Limit. 25 psig Circuit Protection. Power input is isolated, fused and reverse polarity protected Span and Zero Adjustment. Digital, via internally located push-buttons Displays. Standard 2 line x 20 character LCD provides one line of data display. Optional 4 line x 20 character LCD provides up to 4 lines of data display LED's indicate CPU activated, AUTO-zero in progress, AUTO-zero over-ranged, AUTO-purge in progress, and auxiliary alarm "on" status Humidity Limits. 0-95% RH, non-condensing Temperature Limits. -20 $^{\circ}\text{F}$ to 180 $^{\circ}\text{F}$ Storage +40 $^{\circ}\text{F}$ to 140 $^{\circ}\text{F}$ Operating
---	--

P.O. Box 6358 • Santa Rosa, CA 95406 • (707) 544-2706 • (707) 526-2825 Fax • www.airmonitor.com



**AIR MONITOR
CORPORATION**

6 88 2

SUB-B010, Rev 9 (10/02)

IP7_026471

SUBMITTAL SHEET

VELTRON II ULTRA-LOW RANGE DIFFERENTIAL PRESSURE/ FLOW TRANSMITTER

PHYSICAL SPECIFICATIONS

Signal Connections.

High and low pressure, 1/8" FPT

Enclosure.

NEMA 1 aluminum enclosure

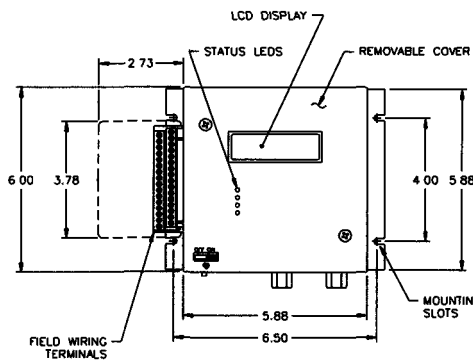
Electrical Connections.

External terminal strip with plug-in connectors Optional
terminal strip enclosure with dual 3/4" conduit connections

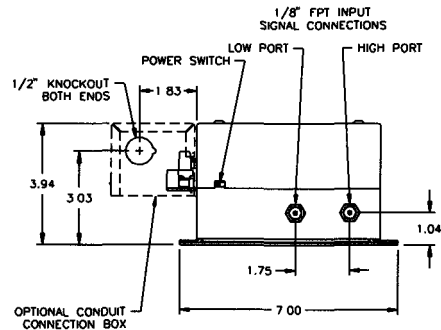
Weight.

4.1 lbs

DIMENSIONAL SPECIFICATIONS

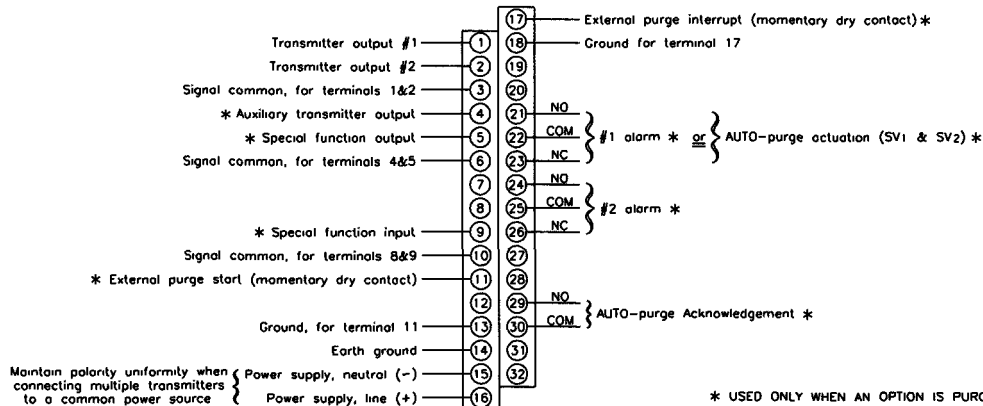


FRONT VIEW



BOTTOM VIEW

WIRING DIAGRAM



P.O. Box 6358 • Santa Rosa, CA 95406 • (707) 544-2706 • (707) 526-2825 Fax • www.airmonitor.com

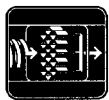
SUB-B011, Rev 5 (10/02)



AIR MONITOR
CORPORATION

6.88.4

IP7_026472



**AIR MONITOR
CORPORATION**

TRANSMITTER SPAN/MASS FLOW CALCULATIONS

PROJECT: **ABT/INTERMOUNTAIN POWER BURNER**
 WORK ORDER: **50633** REV: **2**
 TAG(S): _____

Given Information:

Fluid:
 Standard Temperature (T_{std}):
 Standard Barometric Pressure (P_{std}):
 Air Temperature (T):
 Stack/Duct Pressure (P_g):
 Actual Barometric Pressure (P_{bat}):
 Air Density at Standard Conditions, DRY:
 Duct Shape:
 Duct Diameter:

AIR	
68	(deg. F)
29.921	(in. Hg)
645	(deg. F)
3.00	(in. w.c.)
25.105	(in. Hg)
0.07513	(lbs/ft ³)
CIRC	
62.805	(in.)

% H₂O (by volume)

0.00 (%)

Maximum Differential Pressure:

2.0000 (inches w.c.)

Square Root Extraction? (Yes/No)

No

Output (4-20,0-10,0-5):

4-20 mADC

Calculations:

Stack/Duct Area (A_s): 21.514 (ft²)
 Maximum Actual Velocity: 8,903 (AFPM)
 Absolute Stack/Duct Pressure (P_s): 25.326 (in. Hg)
 Dry Mole Fraction of Stack/Duct (M_{fd}): 1.000
 Dry Molecular Wt. Of Air (M_d): 28.965 (lb/lb-mole)
 Wet Molecular Wt. Of Air (M_s): 28.965 (lb/lb-mole)
 Air Density at Standard Conditions, WET: 0.07513 (lbs/ft³)
 Air Density at Actual Conditions, WET: 0.03039 (lbs/ft³)

% DP (%)	Diff Press (in. w.c.)	Output (mADC)
0	0.0000	4.00
10	0.2000	5.60
20	0.4000	7.20
30	0.6000	8.80
40	0.8000	10.40
50	1.0000	12.00
60	1.2000	13.60
70	1.4000	15.20
80	1.6000	16.80
90	1.8000	18.40
100	2.0000	20.00

Transmitter:

VELTRON II

Flow Element:

IBAM

Transmitter Maximum Range:

0 - 2.00 in w.c.

Power (voltage/type):

24VAC

Power Configuration:

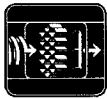
4-Wire

Square Root:

OFF

Display Line #1: **0 - 2.00 in w.c.** (DIFFERENTIAL PRESSURE)

ACTUAL D.P. GENERATED BY IBAM PROBES REQUIRE CORRECTION TO CALCULATE TRUE FLOW



**AIR MONITOR
CORPORATION**

TRANSMITTER SPAN/MASS FLOW CALCULATIONS

PROJECT: ABT/INTERMOUNTAIN POWER BURNER
WORK ORDER: 50633 REV: 2a
TAG(S): _____

Given Information:

Fluid:
Standard Temperature (T_{std}):
Standard Barometric Pressure (P_{std}):
Air Temperature (T):
Stack/Duct Pressure (P_g):
Actual Barometric Pressure (P_{bar}):
Air Density at Standard Conditions, DRY:
Duct Shape:
Duct Diameter:

AIR	
68	(deg. F)
29.921	(in. Hg)
645	(deg. F)
3.00	(in. w.c.)
25.105	(in. Hg)
0.07513	(lbs/ft ³)
CIRC	
62.805	(in.)

% H₂O (by volume)
0.00 (%)

Maximum Differential Pressure:
3.0000 (inches w.c.)

Square Root Extraction? (Yes/No)
No

Output (4-20,0-10,0-5):
4-20 mADC

Calculations:

Stack/Duct Area (A_s): 21.514 (ft²)
Maximum Actual Velocity: 10.904 (AFPM)
Absolute Stack/Duct Pressure (P_s): 25.326 (in. Hg)
Dry Mole Fraction of Stack/Duct (M_{fd}): 1.000
Dry Molecular Wt. Of Air (M_d): 28.965 (lb/lb-mole)
Wet Molecular Wt. Of Air (M_s): 28.965 (lb/lb-mole)
Air Density at Standard Conditions, WET: 0.07513 (lbs/ft³)
Air Density at Actual Conditions, WET: 0.03039 (lbs/ft³)

% DP (%)	Diff Press (in. w.c.)	Output (mADC)
0	0.0000	4.00
10	0.3000	5.60
20	0.6000	7.20
30	0.9000	8.80
40	1.2000	10.40
50	1.5000	12.00
60	1.8000	13.60
70	2.1000	15.20
80	2.4000	16.80
90	2.7000	18.40
100	3.0000	20.00

Transmitter:
Flow Element:
Transmitter Maximum Range:

VELTRON II
IBAM
0 - 3.00 in w.c.

Power (voltage/type):
Power Configuration:
Square Root:

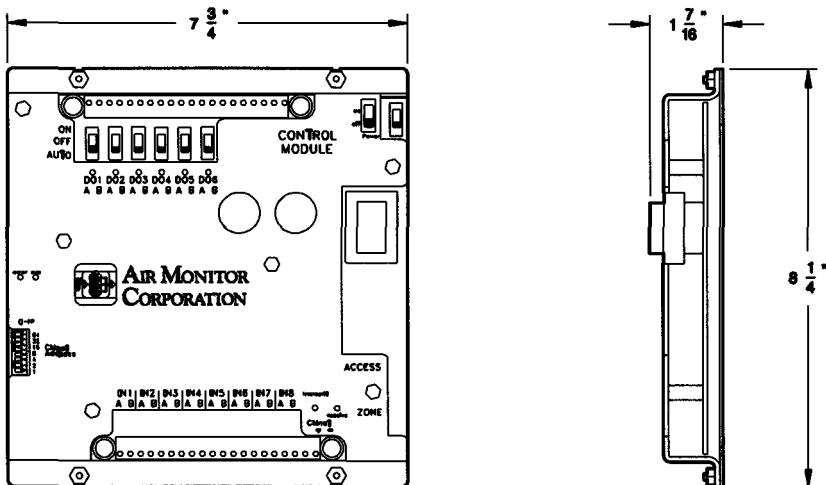
24VAC
4-Wire
OFF

Display Line #1: **0 - 3.00 in w.c.** (DIFFERENTIAL PRESSURE)

ACTUAL D.P. GENERATED BY IBAM PROBES REQUIRE CORRECTION TO CALCULATE TRUE FLOW

SUBMITTAL SHEET

CONTROL MODULE

FEATURES		<ul style="list-style-type: none">• Separate, quick change, plug-in terminal strip for input and output wiring• On/Off power switch on the module• Individual On/Off/Auto switches for relay outputs• Field configurable inputs for 0-5VDC, 4-20mADC, or dry contacts• Factory configured, programmed, and tested Reprogrammable in the field or by remote phone access (requires Communications Module and modem)	
PERFORMANCE SPECIFICATIONS			
Input.	0.1% Resolution	Scan Time.	0.25 second scan cycle time for all inputs and outputs
Output.	0.4% Resolution	Microprocessor.	Motorola MC68HC11
FUNCTIONAL SPECIFICATIONS			
Outputs.	Three analog 0-10VDC Six SPDT relay outputs (Form A), 3 amps maximum @ 24VAC/VDC		
Inputs.	Eight universal inputs (0-5VDC, 4-20mADC, or dry contact)		
Communications.	RS485 port programmable for 9600 to 38.4 kbps		
Memory.	Non-volatile read/write		
Power Supply.	24VAC, 50-60 Hz 20VA maximum Lithium battery provides 10,000 hours of data storage during power outages		
Circuit Protection	Surge protection on input power Optical isolation on RS485 communication line Arc suppression on relay outputs		
Indication.	LED indicators for status of outputs, power, and communication		
Temperature Limit.	-20°F to 180°F storage -40°F to 150°F operating		
DIMENSIONAL SPECIFICATIONS			
			

P.O. Box 6358 • Santa Rosa, CA 95406 ☐ (707) 544-2706 ☐ (707) 526-2825 Fax



**AIR MONITOR
CORPORATION**

SUB-A002, Rev 2 (10/94)

7.14.2

IP7_026475

WARRANTY

PROCESS / POWER

PRODUCTS COVERED

FAN-E/SS
LO-flo/SS
SAP

VOLU-probe/SS
VOLU-probe/SM
SOAP

VOLU-probe/VS-SS
VOLU-probe/FI-SS
STAT-probe/1SS

CA Stations
IBAMS
STACK-probe

WARRANTY

Air Monitor Corporation (hereinafter referred to as "Seller") warrants that at the time of shipment, products sold pursuant to this contract will be free from defects in materials and workmanship, and will conform to the specifications furnished or approved in writing by Seller. No warranty is given that delivered products will conform to catalog sheets, data sheets, and the like, which are subject to change without notice.

Seller will repair or replace, at its option, any products listed under this warranty which is returned freight pre-paid to Seller within the earlier of one (1) year after start-up or fifteen (15) months after shipment that, upon test and examination, proves defective within the terms of this warranty. The warranty period for any item repaired or replaced shall be for the time remaining on the warranty period of the original components. Purchaser shall notify Seller in writing of such defect within sixty (60) days of discovery of the defect.

This warranty does not extend to any product sold by Seller which has been the subject of misuse, neglect, accident, damage or malfunction caused by interconnection with equipment manufactured by others, improper installation or storage, or used in violation of instructions furnished by Seller, nor does it extend to any product which has been repaired or altered by persons not expressly approved by Seller. Nor does Seller warrant equipment against normal deterioration due to environment; nor items such as thermocouples, electrodes, and similar items subject to wear or burnout through usage. Adjustments for items or equipment not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof.

Seller shall not be liable for any special or consequential damages or for loss of damage, directly or indirectly arising from the use of the products. Seller's warranty shall be limited to replacement of defective equipment and shall not include field removal and installation expenses.

The warranty set forth above is in lieu of all other warranties either express or implied and constitutes the full extent of Air Monitor Corporation's liability to the customer, or any other party for breach of warranty. THERE ARE NO EXPRESS WARRANTIES EXCEPT AS SET FORTH HEREIN. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE PARTICULARLY DISCLAIMED.

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AIR MONITOR
CORPORATION

WARR-001, Rev 5 (4/00)

2.18.1

IP7_026476

WARRANTY

PROCESS / POWER

PRODUCTS COVERED

VELTRON II
VEL-trol II
MASS-tron II

VELTRON DPT
VELTRON DPT-plus

MASS-tron II/CEM
Camm

WARRANTY

Air Monitor Corporation (hereinafter referred to as "Seller") warrants that at the time of shipment, products sold pursuant to this contract will be free from defects in materials and workmanship, and will conform to the specifications furnished or approved in writing by Seller. No warranty is given that delivered products will conform to catalog sheets, data sheets, and the like, which are subject to change without notice.

Seller will repair or replace, at its option, any products listed under this warranty which is returned freight pre-paid to Seller within the earlier of three (3) years after start-up or thirty-nine (39) months after shipment that, upon test and examination, proves defective within the terms of this warranty. The warranty period for any item repaired or replaced shall be for the time remaining on the warranty period of the original components. Purchaser shall notify Seller in writing of such defect within sixty (60) days of discovery of the defect.

This warranty does not extend to any product sold by Seller which has been the subject of misuse, neglect, accident, damage or malfunction caused by interconnection with equipment manufactured by others, improper installation or storage, or used in violation of instructions furnished by Seller, nor does it extend to any product which has been repaired or altered by persons not expressly approved by Seller. Nor does Seller warrant equipment against normal deterioration due to environment; nor items such as thermocouples, electrodes, and similar items subject to wear or burnout through usage. Adjustments for items or equipment not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof.

Seller shall not be liable for any special or consequential damages or for loss of damage, directly or indirectly arising from the use of the products. Seller's warranty shall be limited to replacement of defective equipment and shall not include field removal and installation expenses.

The warranty set forth above is in lieu of all other warranties either express or implied and constitutes the full extent of Air Monitor Corporation's liability to the customer, or any other party for breach of warranty. THERE ARE NO EXPRESS WARRANTIES EXCEPT AS SET FORTH HEREIN. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE PARTICULARLY DISCLAIMED.

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AIR MONITOR
CORPORATION

WARR-002, Rev 4 (4/00)

2.22.1

IP7_026477

From: Jerry Finlinson
To: Alan Dewsnap; Neno Hoelzle
CC: Dean Wood
Date: 4/14/2008 6:51 PM
Subject: Burner Flow IBAM tubing weld repairs preliminary report

FYI,

Here is the preliminary report. We hope to finish the inspection Tuesday 4/15

It is recommended that all tubing leaks internal to the wind boxes be heliarc weld repaired.

Front Side

E Level - Inspected 4/11, no leaks on inside

A Level - Inspected 4/14, Leaks: A1 has 1 on bot, A2 has 4 leaks, 1 bot, 1 top, 2 mid (one at cross), A3 none, A4 1 medium leak on mid cross, A5 has 4 leaks, 1 bot, 1 pitot connection, 2 crosses, A6 has 1 leak on mid cross.

F Level - Inspected 4/14, Found leaks F1 bot, F2 has 3 leaks, 2 top and 1 mid, F3 has 2 leak bot, F4 has 1 leak bot, F5 has 2 leaks 1 top and 1 bottom, F6 none

B Level - Inspected 4/14, Found leaks B1 and B2 none, B3, 2 on upper fitting, B4, 1 leak on bottom, B5 major leaks on pipe through burner front wall, inside and outside, B6 2 leaks, one top and one bottom.

Rear Side

D Level - Inspected 4/11 Leaks: D1 has major leak on welded pipe near cabinet, D1 has 2 leaks, D5 has 1 leak, D6 has 1 leak.

H Level - Inspected 4/14, Found Leaks: H1 has 1 mid west cross, H2 none, H3 major leak inside lower pipe feedthrough, 1 on cross, 1 on upper west coupler, 2 on bottom couplers. H4 none, H5 has 2 leaks top and bottom couplers, H6 none.

C Level

G Level

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

IP7_026478

From: Jim Knapp
To: Jerry Finlinson
Date: 4/15/2008 7:02 AM
Subject: Re: Fwd: IBAM E4 natural span 2.0?

Hi Jerry,

Can we operate normally without this unit in operation? If so I think we should just remove it and send it in. If not, we need to get one here for stock and get this one replaced. Let me know.

Jim Knapp
I&C Maintenance Planner
Intermountain Power Service Corp.
850 West Brush Wellman Road
Delta, UT 84635-9546

Phone 435-864-6830
Fax 435-864-0930 or 435-864-6865

>>> Jerry Finlinson 4/14/2008 6:13 PM >>>
Do you think we should get the E4 IBAM Veltron transmitter checked?

Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 5:55 PM >>>
Jerry,

We might want to take a closer look at that unit, sounds like it is malfunctioning. It is possible that it is not accurately outputting and may be in need of repair.

I suggest that we issue an RA and you send it here for inspection and recalibration. We can let you know what we find.

Please let me know what you would like to do.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]

IP7_026479

Sent: Monday, April 14, 2008 4:32 PM
To: Matt Maragos
Subject: RE: IBAM scaling question

All of them have the natural span set at 2".
Except the E4 transmitter, which won't calibrate if the span
is at 2.0". When we do a span cal, we get a bad input error.
So we changed the span to 2.5", then do a span cal and it works great.
So that is rather curious.

It appears to be functioning fine now. But we do have the natural
span set at 2.5 inches.

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 2:09 PM >>>
Jerry,

Based upon what our production people tell me, the -05 doesn't mean it is a
208-050-05 and we need to use the part number on the opposite side
(208-050-04, which indicates these are 2" w.c. natural span transducers).
It is possible to over-range these (to approx. 110%, perhaps higher), but I
am not sure if you would get many up to 2.5" w.c. or why it would not
calibrate to 2" w.c.

Have you checked the other configuration setting in the menus? We need to
verify that it electronically configured to accept a 2" natural span and the
calibrated span is 2" w.c.

Please let me know more of the details how these are being calibrated.

Thanks.

Matt

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]
Sent: Monday, April 14, 2008 8:07 AM
To: Matt Maragos
Cc: Howard Scott; Jim Knapp
Subject: RE: IBAM scaling question

That's interesting. I'm pretty sure both those photos were of the same

IP7_026480

Veltron. The sticker on front said -04 and on back -05.

Our PA was originally at 5" wc, but we have exchanged them and increased them to 10 "wc.

We'll continue our calibration and see what we find.

Another question about the purging.

I was noticing on the IBAM cabinet wiring detail drawing that the first transmitter had wiring on TB 29,30 to the bottom of the purge controller, with purge on internal or external.

All the rest had wiring on TB 11 & 13, they were set to external purge only. Can you explain how this is supposed to work?

Thanks, Jerry

Jerry Finlinson, Control Engineer
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cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

>>> "Matt Maragos" <mmaragos@airmonitor.com> 4/14/2008 8:09 AM >>>
Jerry,

A 208-050-04 is a 2" w.c. natural span transducer, while the 208-050-05 is a 5" w.c. natural span transducer.

I will continue to research, but I believe the PA was 5" w.c. and the IBAMs were 2" w.c.

Matt

-----Original Message-----

From: Jerry Finlinson [<mailto:Jerry-F@ipsc.com>]

Sent: Monday, April 14, 2008 6:51 AM

To: Andy Chew; Matt Maragos

Cc: jbauman@airmonitor.com; Ken Hall; Howard Scott; Jim Knapp

Subject: IBAM scaling question

FYI,

In our recent outage we decided to have the technicians calibrate all the IBAM transmitters. They are scaled to 2.0 inches DP max, so we are having them put in 0 and 2.0 inches to ensure that the 4-20 mA signal is scaled properly. Right off we found one that only went to 16 mA. After some experimentation, it would only calibrate the span, if we

IP7_026481

changed the
natural span to 2.5 inches.

I looked on the transmitters to see if there is a way to tell what the
factory natural span
is supposed to be. Here are some photos of the transmitter board on some
that we
have spanned at 2.0 inches.

Anyway, it appears that we have most of our transducers at 2.0 inches and a
few at 2.5 inches.
I'll continue the calibration and let you know if we find more this way.

Can you identify what the 208-050-04 sticker means? how about the -05 on
the backside?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

"My socks are full of sand dunes." Colin Finlinson

From: Jerry Finlinson
To: Alan Dewsnap; Neno Hoelzle
CC: Dean Wood; Howard Scott; John Fritzges; John Melville
Date: 4/15/2008 5:56 PM
Subject: Burner Flow IBAM tubing weld repairs inspection report

FYI,

Here is the preliminary report. We finished the inspection Tuesday 4/15
Jerry Finlinson, John Melville.

I&C is removing each transmitter and calibrating them in the shop. E4 was scaled incorrectly to a 2.5 inch transmitter, which made the output 30% low.

Laborers have cleaned the dust and mud from the windboxes.

It is recommended that all tubing leaks internal to the wind boxes be heliarc weld repaired. All Leaks have been marked with tape.

Front Side

E Level - Inspected 4/11, no leaks on inside

A Level - Inspected 4/14, Leaks: A1 has 1 on bot, A2 has 4 leaks, 1 bot, 1 top, 2 mid (one at cross), A3 none, A4 1 medium leak on mid cross, A5 has 4 leaks, 1 bot, 1 pitot connection, 2 crosses, A6 has 1 leak on mid cross.

F Level - Inspected 4/14, Found leaks F1 bot, F2 has 3 leaks, 2 top and 1 mid, F3 has 2 leak bot, F4 has 1 leak bot, F5 has 2 leaks 1 top and 1 bottom, F6 none

B Level - Inspected 4/14, Found leaks B1 and B2 none, B3, 2 on upper fitting, B4, 1 leak on bottom, B5 major leaks on pipe through burner front wall, inside and outside, B6 2 leaks, one top and one bottom.

Rear Side

D Level - Inspected 4/11 Leaks: D1 has major leak on welded pipe near cabinet, D1 has 2 leaks, D5 has 1 leak, D6 has 1 leak.

H Level - Inspected 4/14, Found Leaks: H1 has 1 mid west cross, H2 none, H3 major leak inside lower pipe feedthrough, 1 on cross, 1 on upper west coupler, 2 on bottom couplers. H4 none, H5 has 2 leaks top and bottom couplers, H6 none.

C Level - Inspected 4/15, Found leaks: C3 has 5 leaks, 2 on bottom couplers, 1 on mid coupler, 2 on mid crosses, C5 has 1 leak on top, 1 leak on bottom, C6 has one leak on top.

G Level - Inspected 4/15, Found leaks: G1 has 4 leaks, 1 bottom coupler, 1 mid coupler, 2 mid crosses, G6 has 2 leaks, 1 upper west coupler, 1 mid coupler. G4 has 2 leaks in piping near cabinet

I&C is snooping the piping and flex lines outside the windbox. They are redoing the connections with the flex tubing using red RTV. 4 joints require weld repair.

IP7_026483

From: Jerry Finlinson
To: PUNCH
Date: 4/15/2008 6:01 PM
Subject: U2 Burner flow IBAM Engineering Inspection Report
Attachments: 2008 burner IBAM Engineering Inspection Report.wpd; D6 burner front flex line leaks.JPG; U2 IBAM A4 mid leaks sm.jpg; U2 IBAM majot leak on burner feedthrough pipes sm.jpg

FYI,

I&C is removing each transmitter and calibrating them in the shop. E4 was scaled incorrectly to a 2.5 inch transmitter, which made the output 30% low.

Laborers have cleaned the dust and mud from the windboxes.

It is recommended that all tubing leaks internal to the wind boxes be heliarc weld repaired. All Leaks have been marked with tape.

Front Side

E Level - Inspected 4/11, no leaks on inside

A Level - Inspected 4/14, Leaks: A1 has 1 on bot, A2 has 4 leaks, 1 bot, 1 top, 2 mid (one at cross), A3 none, A4 1 medium leak on mid cross, A5 has 4 leaks, 1 bot, 1 pitot connection, 2 crosses, A6 has 1 leak on mid cross.

F Level - Inspected 4/14, Found leaks F1 bot, F2 has 3 leaks, 2 top and 1 mid, F3 has 2 leak bot, F4 has 1 leak bot, F5 has 2 leaks 1 top and 1 bottom, F6 none

B Level - Inspected 4/14, Found leaks B1 and B2 none, B3, 2 on upper fitting, B4, 1 leak on bottom, B5 major leaks on pipe through burner front wall, inside and outside, B6 2 leaks, one top and one bottom.

Rear Side

D Level - Inspected 4/11 Leaks: D1 has major leak on welded pipe near cabinet, D1 has 2 leaks, D5 has 1 leak, D6 has 1 leak.

H Level - Inspected 4/14, Found Leaks: H1 has 1 mid west cross, H2 none, H3 major leak inside lower pipe feedthrough, 1 on cross, 1 on upper west coupler, 2 on bottom couplers. H4 none, H5 has 2 leaks top and bottom couplers, H6 none.

C Level - Inspected 4/15, Found leaks: C3 has 5 leaks, 2 on bottom couplers, 1 on mid coupler, 2 on mid crosses, C5 has 1 leak on top, 1 leak on bottom, C6 has one leak on top.

G Level - Inspected 4/15, Found leaks: G1 has 4 leaks, 1 bottom coupler, 1 mid coupler, 2 mid crosses, G6 has 2 leaks, 1 upper west coupler, 1 mid coupler. G4 has 2 leaks in piping near cabinet

I&C is snooping the piping and flex lines outside the windbox. They are redoing the connections with the flex tubing using red RTV. 4 joints require weld repair.

Jerry Finlinson, Control Engineer
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jerry-f@ipsc.com

IP7_026484

"My socks are full of sand dunes." Colin Finlinson

Engineering Services Inspection Report

INTERMOUNTAIN POWER SERVICE CORP.

System:	2SGB-FT-172 thru 219	Date:	4-15-08
Description:	U2 Burner Flowmeter IBAM	Page:	1 of 2
By:	Jerry Finlinson		

I&C is removing each transmitter and calibrating them in the shop. E4 was scaled incorrectly to a 2.5 inch transmitter, which made the output 30% low.

Laborers have cleaned the dust and mud from the windboxes.

It is recommended that all tubing leaks internal to the wind boxes be heliarc weld repaired. All Leaks have been marked with tape.

Front Side

E Level - Inspected 4/11, no leaks on inside

A Level - Inspected 4/14, Leaks: A1 has 1 on bot, A2 has 4 leaks, 1 bot, 1 top, 2 mid (one at cross), A3 none, A4 1 medium leak on mid cross, A5 has 4 leaks, 1 bot, 1 pitot connection, 2 crosses, A6 has 1 leak on mid cross.

F Level - Inspected 4/14, Found leaks F1 bot, F2 has 3 leaks, 2 top and 1 mid, F3 has 2 leak bot, F4 has 1 leak bot, F5 has 2 leaks 1 top and 1 bottom, F6 none

B Level - Inspected 4/14, Found leaks B1 and B2 none, B3, 2 on upper fitting, B4, 1 leak on bottom, B5 major leaks on pipe through burner front wall, inside and outside, B6 2 leaks, one top and one bottom.

Rear Side

D Level - Inspected 4/11 Leaks: D1 has major leak on welded pipe near cabinet, D1 has 2 leaks, D5 has 1 leak, D6 has 1 leak.

H Level - Inspected 4/14, Found Leaks: H1 has 1 mid west cross, H2 none, H3 major leak inside lower pipe feedthrough, 1 on cross, 1 on upper west coupler, 2 on bottom couplers. H4 none, H5 has 2 leaks top and bottom couplers, H6 none.

C Level - Inspected 4/15, Found leaks: C3 has 5 leaks, 2 on bottom couplers, 1 on mid coupler, 2 on mid crosses, C5 has 1 leak on top, 1 leak on bottom, C6 has one leak on top.

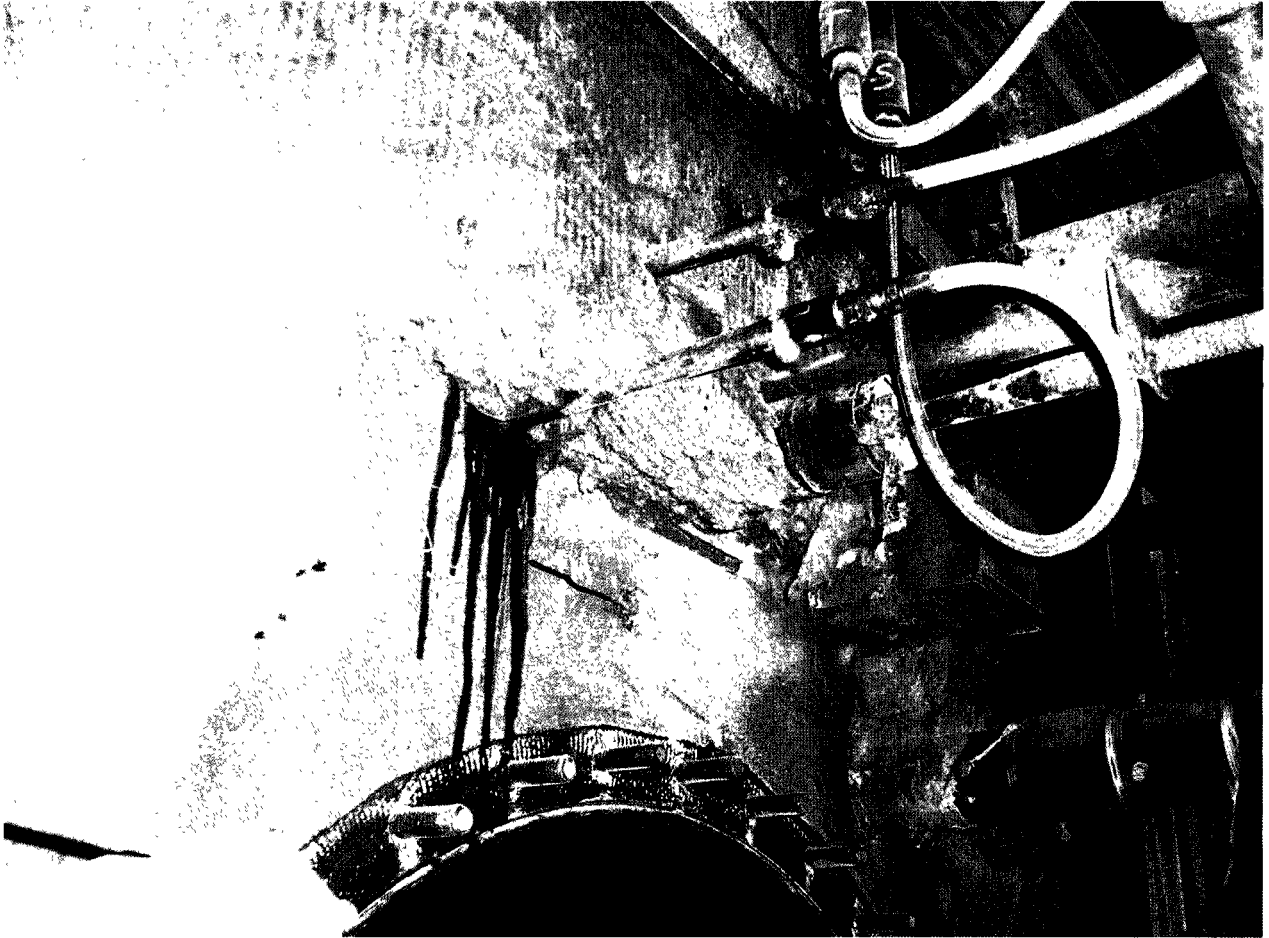
G Level - Inspected 4/15, Found leaks: G1 has 4 leaks, 1 bottom coupler, 1 mid coupler, 2 mid crosses, G6 has 2 leaks, 1 upper west coupler, 1 mid coupler. G4 has 2 leaks in piping near cabinet

Engineering Services Inspection Report

INTERMOUNTAIN POWER SERVICE CORP.

System:	<u>2SGB-FT-172 thru 219</u>	Date:	<u>4-15-08</u>
Description:	<u>U2 Burner Flowmeter IBAM</u>	Page:	<u>2 of 2</u>
By:	<u>Jerry Finlinson</u>		

I&C is snooping the piping and flex lines outside the windbox. They are redoing the connections with the flex tubing using red RTV. 4 joints require weld repair.



IP7_026488

From: Jerry Finlinson
To: Alan Dewsnap; Neno Hoelzle
CC: Dean Wood; Howard Scott; John Fritzges; John Melville
Date: 4/18/2008 7:56 AM
Subject: Burner Flow IBAM tubing weld repairs inspection report
Attachments: IBAM leak priority ranking 18apr08.xls

FYI,

Because there were so many leaks in the burner IBAM pitots, we can't fix them all, so I went through and tested all the leaks again and ranked them according to severity. The ones that are 4 and above are quite severe and should be fixed if possible. There are 9 of those.

Thanks, Jerry

IP7_026489

U2 Burner IBAM pitot leak ranking							
Updated 18apr08							
by Jerry Finlinson							
Rank Legend: 1= minor, 5= major leak							
			inside	inside	inside	inside	inside
Burner			Wall	lower	mid	mid	top
Boiler	Front	Outside	connection	couplers	couplers	crosses	couplers
E	1						
E	2						
E	3						
E	4						
E	5						
E	6						
A	1			fixed			
A	2			1	2	2	
A	3						
A	4					3	
A	5		4	2		1,2	
A	6						
F	1			2, 2			
F	2				1		2, 2
F	3			1, 1			
F	4			1			
F	5						1
F	6						
B	1						
B	2						
B	3						2, 3
B	4			1			
B	5		4, 5				
B	6			2			2
Boiler Rear							
D	1	3			3	1	
D	2						
D	3						
D	4						
D	5						2
D	6						
		union					
H	1					2	2
H	2						
H	3		4	3, 3	4	2	3
H	4			4			
H	5						3
H	6						
C	1			3			
C	2						
C	3			1, 3	4	3, 2	
C	4						
C	5			1			2
C	6						2
G	1			4	3	1, 1	
G	2						
G	3						
G	4	3, 3					
G	5						
G	6				2		3, 5

--	--	--	--	--	--	--	--	--

From: Garry Christensen
To: Jerry Finlinson
Date: 4/18/2008 1:43 PM
Subject: IBAMS
Attachments: Garry Christensen.vcf

Jerry, I noticed that D1, D2, A3 and B5 all were off from zero pressure compared to the rest. Hopefully we can get them all working correctly.

Garry Christensen
Intermountain Power Service Corp.
Performance Engineer
850 W. Brush Wellman Road
Delta, Utah 84624-8546
garry-c@ipsc.com (<mailto:garry-c@ipsc.com>)
Telephone (435) 864-6486

From: Jerry Finlinson
To: DCS Group
CC: Jim Knapp
Date: 4/29/2008 3:00 PM
Subject: U2 ABT burner flow span - decrease F&D to 239K

FYI,

About a year ago, in order to minimize erosion on the F and D burners, we increased the scale to 270 klbm/hr on those two levels.

Now that all the burners are the same we need to make sure the span of F& D is the same as the other burners, 239 klbm/hr.

Could you have someone check that in the DCS?

Thanks, Jerry

Jerry Finlinson, Control Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 FAX 0776
cell 435-406-4754
jerry-f@ipsc.com

We have less than 1 week left of this April 2008 outage.

>>> Jerry Finlinson 3/13/2008 9:58 AM >>>

Howard,

You were asking about I&C support for the new ABT burner elbows and inner burner pipes that are being installed this outage. I just checked with Garry C. He informed me that ABT is sending some new thermocouples to be installed in new (straight) thermowells that are going to measure the burner tip temperature.

They will need I&C to pull out the old thermocouples and flame scanners immediately when the unit comes offline.

(Off course we want to record dark furnace voltage measurements first.)

We will need the DCS crew to increase the alarm limit temperature on the thermocouple alarms. Currently we are not sure what new temperature setpoint to use.

Also we need to rescale the PA flow into unit 2 F and D mills. They were previously scaled up to 270K lb/hr on PA flow and the other mills are 239 Klb/hr.

Gary, let us know if you have any further details.

Thanks, Jerry

IP7_026493

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What's the best thing you could be working on, and why aren't you? Richard Hamming

From: James Burr
To: PI
Date: 5/1/2008 12:47 PM
Subject: U2 Burner Front Temps in PI Process Book

During the Unit 2 outage, the burner front thermocouples were moved and the alarm limits have been changed in the DCS and in PI. The alarm limits vary depending whether the mill is "ON" (800 degrees) or "OFF" (1400 degrees). The limits are under evaluation and may be changed again, Garry Christensen is working on this.

The Burner Front Temperature Display in PI has been modified by Mike Hill and incorporates the new limits. In Process Book go to << U2 Power Block, << Fuel, << Burner Front Temperatures.

From: Jerry Finlinson
To: Howard Scott; Jim Knapp
CC: DCS Group; Garry Christensen; James Burr
Date: 5/14/2008 4:36 PM
Subject: IBAM B5, B4, D1, D2 problems
Attachments: IBAM B4 flex hose stretched tight.JPG

Howard,

I walked down the IBAM flow transmitters that are still giving us problems. There are currently 3 that are reading low in PI: B5, D1, D2.

However, D1 is reading in the DCS, there is some problem between the DCS and PI. Nothing was changed during the outage, so we don't understand why it stopped working.

B5 is reading unreliable, which is what happens if it gets overranged. Could you have someone take a low dp transmitter up there and measure the DP across the burner pitot for B5 and D2. They can do it in the IBAM cabinet. The DP should be about 0.6, and the transmitters are 2 inch dp ranged.

Please note in the attached photo that the stainless flex line on B4 burner IBAM is too short, it is stretched tight and kinked. Please have someone replace it with a longer one. The current one is about 24 inches. So if there were a 30 or 36, that would be good.

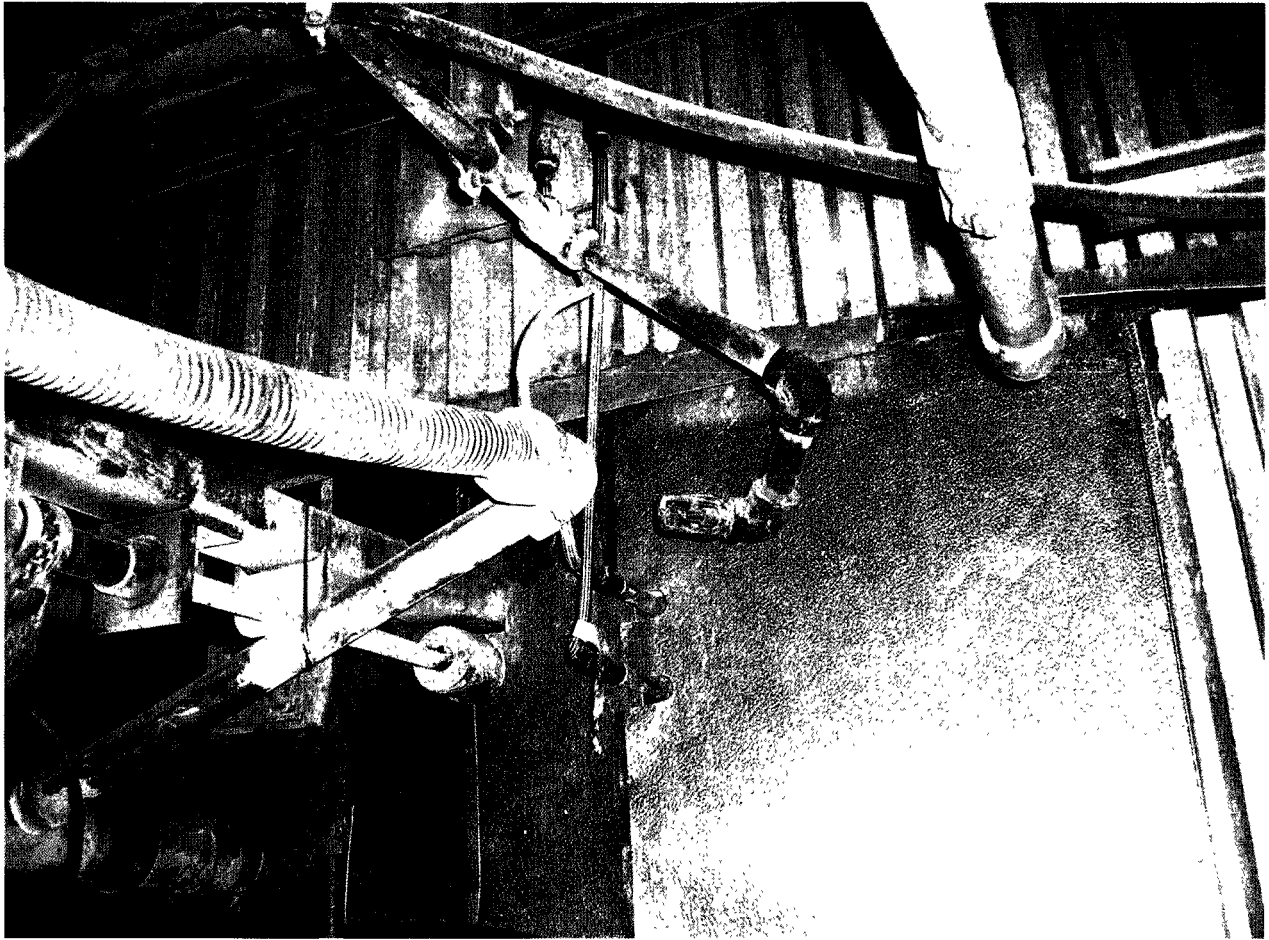
Jim Knapp can write a work order to do this work.

Thanks, Jerry

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There's always more to do than you can do. Prioritize!

IP7_026496



IP7_026497

From: James Burr
To: Howard Scott; Jerry Finlinson; Jim Knapp
CC: Bill Morgan; Chris Mork; Garry Christensen; Gary Dean; Ken Nielson; ...
Date: 5/15/2008 11:22 AM
Subject: Re: IBAM B5, B4, D1, D2 problems

D1 is working in PI now. Steve Higgs found that a controller had a name conflict in the DCS. He has fixed this and now it gives the correct reading.
-James

>>> Jerry Finlinson 5/14/2008 4:36 PM >>>
Howard,

I walked down the IBAM flow transmitters that are still giving us problems. There are currently 3 that are reading low in PI: B5, D1, D2. However, D1 is reading in the DCS, there is some problem between the DCS and PI. Nothing was changed during the outage, so we don't understand why it stopped working.

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Jim Knapp can write a work order to do this work.

Thanks, Jerry

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There's always more to do than you can do. Prioritize!

IP7_026498

From: Jerry Finlinson
Start: 9/8/2008
Due: 9/8/2008
Subject: Updated IBAM DTF file.